1981

ADAPTIVE RESEARCH REPORTS

PLANT INDUSTRY BRANCH
NEW BRUNSWICK DEPARTMENT OF AGRICULTURE
AND RURAL DEVELOPMENT

H. RAYMOND SCOVIL
DEPUTY MINISTER

HON. MALCOLM N. MACLEOD
MINISTER OF AGRICULTURE

FEBRUARY, 1982

TABLE OF CONTENTS

Introduction

PAGE

APPLES

1. Biological Control of Apple Leaf Midge - D. B. Finnamore 1

2. Evaluation of The Effect Of Calcium Foliar Spray on Quality and Yield of McIntosh Apples - I. Ghanem 3

3. Fertilizing and Pruning Red Delicious -E. Estabrooks 7

4. Growth Regulator Treatment of Young Apple Trees to Induce Fruiting -E. Estabrooks 8

5. Summer Pruning Demonstration -E. Estabrooks 10

BLUEBERRIES

6. Evaluation of Automatic Mist Blower For Use in Wild Stand Blueberries -1981.-S.Michaud 12

7. Pennfield Native Blueberry Improvement Project - S. Michaud 15

8. Weed Control in Wild Lowbush Blueberries - D.Doohan 18

9. Demonstration of Atrazine for Weed Control in Wild Blueberries -D. Doohan 24

10. Velpar Herbicide and Fertilizer for Wild Lowbush Blueberries- D.Doohan 27

11. Cultivated Lowbush Blueberry Demonstrations- S.Michaud 32

12. Cultivated Lowbush Blueberry Fertility Trial -S. Michaud 35

13. Planting of Lowbush Blueberry Clones in Sod -S. Michaud 38

14. Blueberry Clone Evaluations -B. W. Dykeman 40

15. Cultivated Lowbush Blueberry Crop Scheduling Study- B. Dykeman 42

16. Trickle Irrigation and Mulching of Cultivated Blueberries - B. Dykeman 45

17. Mid-Highbush Blueberry Clone Evaluation - B. Dykeman 46

STRAWBERRIES & RASPBERRIES

18. The Effect of Cultural System on Strawberry Yields - E. Estabrooks 47

19. Progress Report on Strawberry Cultivar Trial - E. Estabrooks 50

20. Mechanical Strawberry Harvester Evaluation -E. Estabrooks 54

21. Evaluation of Herbicides for Weed Control in Strawberries -D. Doohan 58

22. Demonstration of Strawberry Yield Enhancement by Soil Fumigation -D. Finnamore 61

23. Evaluation of Soil Fumigants on Strawberry Soils -B. Dykeman 64

24. Winter Mulching of Strawberries -D. Doohan 67

25. Red Raspberry Cultivar Trial -E. Estabrooks 71

ORNAMENTALS

26. Regional Bedding Plant Trials -A. Currie 73

27. Poinsettia Soilless Media Trial -A. Currie 80

28. Ornamental Evaluation Program (1978-81) -B. Dykeman 82

VEGETABLES

29. Evaluation of Asparagus Cultivars -R. Cormier 92

30. Scheduling Wax Bean Production -P. Smith 94

31. Influence of Boron on Quality of Brussels Sprouts -R. Cormier 99

32. Evaluation of Anti-Crustants on Carrot Emergence and Total Marketable Yield -K. Michalica 101

33. Preliminary Report on the Use of Predictive Scheme for Scheduling Fungicide Sprays to Control Carrot Blight -K. Lynch 106

34. Calcium As It Affects Black Heart In Celery -R. Cormier 109

35. Monitoring Moth Flights of Corn Insects Using Black Light Insect Traps -D. Finnamore 112

36. Screening Herbicides for the Ostrich (Fiddlehead) Fern -D. Doohan 115

37. Crop Management of the Ostrich Fern -B. Dykeman 117

38. Effects of Shade on Growth and Development of the Ostrich Fern -B. Dykeman 119

39. Fumigation of Soils for Ostrich Fern Establishment -B. Dykeman 124

40. Ostrich Fern Clone Evaluation Program 1981 -B. Dykeman 126

41. Propagation of the Ostrich Fern -B. Dykeman 129

42. Comparison of Crop Rotations in Potato Production System -I. Ghanem 130

43. The Effect of Deep Tillage on Potato Production on Compacted Soil -K. Michalica 132

44. Potato Late Blight Spray Forecast -G. Read 135

45. Tomato Yield Response (Under Plastic Mulch) to Nitrogen Fertilizer and Transplanting Date -R. Cormier 137

46. Use of Floating Mulch on Vegetable Crops -R. Cormier 141

47. Weed Control for Vegetables Grown With Plastic Mulch -D. Doohan 145

48. Plastic Tunnel Microclimate -P. Smith 153

49. Demonstration of Precision Seeders and Evaluation of Gel Seeders for Vegetables -C. Everett 157

50. No Tillage Technology for Vegetable Crops to Minimize Soil Erosion -R. Cormier 160

51. Screening Herbicides for Marsh Hedge Nettle (Whiteroot) -D. Doohan 162

CEREALS & PROTEIN CROPS

52. Demonstration of Growth Regulator on Barley -C. McLean 165

53. Comparison of Japanese & Tartary Buckwheats -J. Damboise 167

54. Evaluation of Seven Levels of Fertility on Mecan Buckwheat -J. Damboise 170

55. Cereal Drillbox Survey -K. MacIsaac 173

56. Grain Yield Survey -C. McLean 178

57. Comparison of Grain Management Systems C. McLean 181

58. Intensive Grain Management Project - J. Damboise 184

59. Effect of Seed Treatments on Wheat Yield -J. Damboise 189

60. Spring Milling Wheat Production Evaluation -J. Dambois 192

61. Grand Falls Wheat and Barley Variety Evaluation -J. Damboise 198

62. Evaluation of Agronomic Characteristics of Winter Cereal Cultivars Across Planting Dates -D. Walker 203

63. Winter Wheat Demonstration -C. McLean 212

64. Winter Rye As a Cover Crop -J. Damboise 214

65. Soybean Feeding Trial -J. Damboise 217

66. Soybean Inoculant Evaluations -C. McLean 221

67. Soybean Variety Evaluation -K. MacIsaac 225

FORAGES

68. Biological Control of Canada Thistle -D. Finnamore 229

69. Biological Control of The Ragwort Weed -D. Finnamore 231

70. Weed Control in Seedling Alfalfa -D. Doohan 232

71. Sussex Regional Corn Trial -S. Clare 237

72. Forage Yield Survey 1981-Corn -S. Clare 240

73. Forage Quality on New Brunswick Farms -K. MacIsaac 243

74. Forage Quality Forecasts -R.E. McQueen 247

75. Forage Yield Survey Perennial Crops -S. Clare 249

76. Demonstration of Control of Smooth Bedstraw in Timothy -D. Doohan 251

SOILS & CLIMATE (GENERAL)

77. Application of Meteorology To Crop Production -G. Read 254

78. Climatic Monitoring at Crop Demonstration Trials -G. Read 258

79. Improvement of Soil Physical Properties by the Breakup of Tillage Pans -J. MacMillan 260

80. Sweet Clover As a Soil Conditioner -J. MacMillan 265

81. Mineral Content of Soils In The Belledune Area -J. MacMillan 268

82. pH of Interval Soil and Its Changes by Additions of Lime -K. Michalica 273

83. Predicting Soil Erodibility (K) Values For New Brunswick Soils Using a Soil Erodibility Nomograph -J. MacMillan 276

INTRODUCTION

This year's Adaptive Research Report is a summation of the trials and demonstrations which Plant Industry Branch personnel were involved in conducting during 1981. This is the third annual release of the Report published to ensure that growers and other agricultural workers are aware of and have access to project findings. Anyone wanting further information about any particular project is advised to contact the respective author(s) directly.

I would like to congratulate staff members for their dedication in carrying out their projects and on their behalf extend thanks to all producers and agencies that provided assistance and co-operation.

The financial support of Technology Transfer Program of the General Development Agreement, a cost shared Canada-New Brunswick Regional Development Project, is recognized for its essential contribution to many of the reports contained herein.

Mr. David B. Finnamore is given special acknowledgement for his continued effort as editor which makes publication of this Report possible.

Acknowledgement is made to the Word Processing Centre for carefully typing the papers, to the Communications Section of the N. B. Department of Agriculture for printing and binding the publication and to the Translation Bureau for translating the reports. Comments and suggestions that would lead to improving future issues of this Report are solicited.

E. T. Pratt
Director
Plant Industry Branch
N. B. Department of
Agriculture & Rural
Development
Fredericton, N. B.

BIOLOGICAL CONTROL
OF
APPLE LEAF MIDGE
PRELIMINARY REPORT

BY

D. B. FINNAMORE[1]

Abstract: Two parasite species were released in an apple orchard to establish a biological control for the apple leaf midge, Dasineura mali. Adults of one parasite species were successfully reared from mature midge larvae.

INTRODUCTION: The apple leaf midge, *Dasineura mali (Kief.)*, was first noted in New Brunswick apple orchards in 1964, (MacPhee 1978). Since then, the insect has infested orchards in most areas of the province. In co-operation with Dr. A. W. MacPhee, Agriculture Canada, Research Station, Kentville, N. S. and Dr. J. S. Kelleher, Biological Control Laboratory, Agriculture Canada, Ottawa, Ontario, imported parasites were released for the biological control of the midge in the apple orchard of Mr. Gerald Reed, Keswick Ridge, York Co., N. B.

METHODS: Two parasite species, collected in Europe and imported to Canada by the Biological Control Laboratory were released in Mr. Reed's orchard. No insecticide sprays were applied to the orchard block after the parasites were released.

The first parasites, *Platygaster machali*, were released in cages placed over apple branches having leaves infested with midge larvae. Two parasite releases were made when first generation midge larvae were in the apple leaves, and two further releases were made when second generation midge larvae were infesting the leaves. An approximate total of eighty-seven males and one hundred and five females of *P. marchali* were released in cages.

---

[1] Provincial Entomologist, New Brunswick Department of Agriculture and Rural Development.

The second parasite, *Inostemma contariniae*, was received for release when first generation midge larvae were mature and many larvae had left the leaves to pupate in the ground. Due to the fact that only a few midge larvae were left in the leaves, an open release was made of *I. contariniae*. A total of thirty parasites were released.

RESULTS: A few mature larvae of the first and second generation midges were collected from the cages containing *P. marchali*. The larvae were collected as they left the leaves to pupate in the soil. The mature larvae were placed in jars containing sand where they pupated. Adult parasites of *P. marchali* were reared from both the first and second generation larvae. Whereas only a few larvae were collected to determine if the parasites would survive, no attempt was made to determine the percentage parasitism.

Due mainly to the fact that an open release was made of a few parasites of *I. contariniae* and when most of the midge larvae had left the leaves, no attempt was made to determine if the parasite became established.

RECOMMENDATIONS: The apple leaf midge population should be monitored for several years. Mature larvae should be reared to determine if the parasite species have become established and also to determine the percentage parasitism of the apple leaf midge.

REFERENCES: MacPhee, A. W., D. B. Finnamore. 1978. The Apple Leaf Midge, *Dasineura mali (Diptera: Cecidomyiidae)* in New Brunswick Apple Orchards. Can. Ent. 110: 1363.

EVALUATION OF THE EFFECT OF CALCIUM FOLIAR SPRAY ON QUALITY AND YIELD OF MCINTOSH APPLE

BY

I. GHANEM, R. BUCHANAN, E. ESTABROOKS[1]

Abstract: The effect of calcium sprays on controlling calcium deficiency disorders is being evaluated in two commerical orchards, one having young trees and the other having mature trees.

Two calcium sources, calcium chloride and calcium chelate at different frequencies of application are being tested. Records of fruit firmness, and degree of maturity as effected by treatment were taken. Yield data will also be collected for 1982 season.

INTRODUCTION: Since calcium is less available in acid soils, liming programs are essential where soil pH is low. However, in some cases where the soil is limed, calcium levels in the leaves and the fruit has been observed to be low. Factors as draught and high K/Ca and Mg/Ca ratios has been attributed to cause calcium deficiency. Calcium deficiency may cause bitter pit, softening and breakdown of the fruit during storage. Under these circumstances, foliar sprays with calcium salts have been recommended or calcium dip of the fruits as methods of control. Generally, calcium chloride is the most effective material, however, leaf injury from this salt limits its use unless the necessary precautions are taken. The objective of this trial is to compare calcium chloride sprays with calcium chelate sprays under two spraying schedules. Also, the response of young and mature trees to the above mentioned treatment is compared.

---

[1] Position - Soil Specialist, Soil Technician, and Fruit Crop Specialist respectively, New Brunswick Department of Agriculture.

Materials and Methods

The Treatments under study are described in Table (1).

Table (1) Treatments

Treatment	Calcium source	number of application	rate of application
1	control	control	control
2	calcium chloride 20% Ca	6	5 kg/1000L/ha
3	calcium chloride 20% Ca	first 3 applications last 3 applications	5 kg/1000L/ha 10 kg/1000L/ha
4	calcium chelate 6% Ca	3	3.6 kg/250L/ha
5	calcium chelate 6% Ca	6	3.6 kg/250L/ha

First spray was applied in the 1st half of June and other sprays were applied at two week intervals.

Each treatment consisted of single trees replicated five times. The trial was conducted on mature trees at Gagetown, N.B. and it was repeated on young trees at Keswick Ridge.

RESULTS AND DECISIONS: Leaf samples were collected on August 4, 1981. The results are shown in Table (2):

Table (2) Leaf Analysis

Treatment	Young Trees				Mature Trees			
	N%	K%	Mg%	Ca%	N%	K%	Mg%	Ca%
1	2.33	1.16	0.25	1.02	1.98	1.89	0.22	0.88
2	2.52	1.28	0.24	1.06	2.04	1.84	0.23	0.92
3	2.47	1.25	0.21	1.00	1.98	1.94	0.22	0.91
4	2.60	1.31	0.24	0.94	2.00	1.99	0.22	0.79
5	2.37	1.36	0.23	0.92	1.92	1.86	0.22	0.85

Leaf burn was observed in the orchard where the high application rate of calcium chloride was used. This requires orchardist to pay careful consideration to the rate of application when using calcium chloride spray as a correction method for calcium disorders.

It is also noted that Ca-chelate sprays reduced calcium levels in the leaves. This can be attributed to higher mobility of calcium within the three when it is applied in the chelate form.

Next year monitoring of nutrient levels in the apple leaves and fruits would give a better indication of the effect of treatments.

Fruit samples were collected in the third week of September for starch and pressure tests. The results are shown in Table 3 and 4.

Table (3) Average Starch Test (Scale 1-9)

Treatment	Average Starch Test Young Trees	 Mature Trees
1	4	6
2	5	6
3	5	6
4	5	7
5	5	7

Table (4) Average Pressure Test

Treatment	Average Pressure Test Kg/cm^2 Young Trees	 Mature Trees
1	7	8
2	7	8
3	7	8
4	7	7
5	6	7

There seem to be no effect of treatment at the first year of application on the values of pressure or starch tests.

REFERENCES:

Webster, D.H.

Influence of Hydrated Lime, Gypsum and Nitrogen Source on Bitter Pit of Apple.

Annual Report of Kentville, Research Station, Nova Scotia 1980, page 24-25.

ACKNOWLEDGEMENT:

The authors wish to express their appreciation to Mr. D. Jones and Mr. H. Estabrooks for their cooperation and assistance in conducting this trial.

Thanks also are due to Niagara Chemical, Division of Reichhald Ltd., for supplying the Ca-chelate source.

A PRELIMINARY REPORT ON FERTILIZING AND PRUNING RED DELICIOUS

BY

E. N. ESTABROOKS AND G. W. REED[1]

Abstract: A trial was established in 1981 using a block of seven year old Red Delicious trees to improve the volume of marketable fruit produced through improved fertilization and pruning.

INTRODUCTION: The apple cultivar Red Delicious is generally found to be a light cropper with small fruit under New Brunswick conditions. It is recognized that the growing season here is short for proper maturity of Red Delicious but there is a desire by apple growers to produce it because of the strong market demand. Some effort has been made to assess various strains of Red Delicious to find the strains most suited to New Brunswick conditions but no superior strains have been found to date.

It is recognized that Red Delicious requires a high fertility level and require heavier pruning to produce large fruit. To determine the required levels, a trial incorporating fertility and pruning was initiated.

METHODS: Individual trees in a block of 27 young Red Delicious (Early Bright strain) on M111 received three levels of 10-10-10 fertilizer and three levels of pruning. The trial was set up as a 3 x 3 Factorial and was replicated three times. Leaf analysis samples were taken in late summer and fruit yields were recorded.

RESULTS: Preliminary yield results indicate a great variability between trees. Yields varied from 1.4 to 7 kg/tree. Best average yields were with medium fertility and heavy pruning. Heavy fertility with medium pruning gave the largest size fruit.

No major changes in yield or size are expected until 1982.

---

[1] Fruit Crops Specialist and Fruit Crops Technician, respectively, New Brunswick Department of Agriculture and Rural Development.

A PRELIMINARY REPORT
ON
GROWTH REGULATOR TREATMENT OF YOUNG APPLE TREES TO INDUCE FRUITING[1]

BY

E. N. ESTABROOKS[2]

Abstract: Alar and alar plus ethrel have been applied to induce flowers in young apple trees slow to produce fruit. Growth regulator treatments were compared to scoring as a means to increase flower bud formation.

INTRODUCTION: Most new apple orchards are of cultivars and rootstocks which tend to produce a crop of fruit within a few years after planting. However, occassionally some blocks of apples are slow to produce bloom and set a crop. Such an occurance can be discouraging to growers and reduce further planting. Growth regulators daminozide (Alar) and Alar plus ethephon (Ethrel) have been used to reduce vegetative growth and induce flowering. The timing and conditions of growth at time of treatment have proven to be most critical for effective and reliable results (Greene and Lord 1979). There is a need to refine the use of growth regulators for inducing flower bud formation so that growth regulations may become another effective tool in making new orchards profitable.

METHODS: A block of 7 year old McIntosh and Red Delicious apple trees which have produced only light crops to date and with little bloom in 1981 were treated with two levels of Alar and two levels of Alar plus Ethrel. Treatments were applied 10 days after petal fall (June 11 for McIntosh and June 16 for Red Delicious) when new terminal growth was about 12 to 15 cm. Scoring treatments were applied on the same day as the chemical treatments in accordance with the cultivar. Treatments were applied to randomized individual trees as a dilute spray and were replicated five times.

---

[1] Financially supported by Technology Transfer program, A.S.A. II.

[2] Fruit Crops Specialist, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development

Records of terminal length and other growth characteristics were taken in mid summer (July 22).

RESULTS: As a result of the treatments it is apparent that terminal growth was affected (Table 1). With McIntosh treated with Alar 4 kg/ha plus Ethrel .7 l/ha the average terminal growth was reduced by 45% compared to the check trees. For Red Delicious that same treatment reduced terminal growth by 53% from that of the check. In some growth regulator treatments little new terminal growth took place after treatment. The scoring treatment generally reduced terminal growth less than the growth regulator treatments but did result in reduced growth of 32% for both McIntosh and Red Delicious. Scoring produced pale colored leaves.

Most trees produced few fruits regardless of treatments, however, Red Delicious trees having received Alar plus Ethrel at either the high or the low rate produced no fruit at all.

The number of flower buds will be recorded in the spring of 1982 for the various treatments.

Table 1
Effect of Alar and Ethrel on Terminal Growth of Young McIntosh and Red Delicious Apple Trees - 1981

	MCINTOSH	RED DELICIOUS
Treatment	Average Terminal Growth (cm)	Average Terminal Growth (cm)
Alar 3 kg/ha	20.4	18.3
Alar 6 kg/ha	19.3	18.5
Alar 2 kg/ha - Ethrel .7 l/ha	17.0	14.7
Alar 4 kg/ha - Ethrel .7 l/ha	16.2	12.9
Scoring	20.3	18.5
Check	29.7	27.4

SUMMARY: Growth regulators Alar and Ethrel had an suppressing effect on the amount of vegetative growth produced by young McIntosh and Red Delicious apple trees treated ten days after petal fall when terminal growth was 12 to 15 cm. Scoring also reduced vegetative growth. Records as to the effect on reproductive growth will be taken in 1982.

A PRELIMINARY REPORT ON SUMMER PRUNING DEMONSTRATION[1]

BY

E. N. ESTABROOKS[2]

Abstract: A summer pruning demonstration was started using commercial orchards in two locations with two cultivars at each site. The pruning demonstration was set up to illustrate how apple trees could be maintained within their allotted space through removal of vegetative growth in summer while retaining production of high quality fruit.

INTRODUCTION: Summer pruning has been practiced for centuries by European gardeners in order to restrict vegetative growth and to induce the formation of flowering spurs. Research on summer pruning conducted in the early 1900's produced widely differing results depending on type of pruning, tree vigor and cultivar.

Summer pruning generally refers to the detail cutting of current season's shoots throughout the tree to restrict vegetative growth and induce the formation of flower buds during July and August. Summer pruning in late July and early August usually produce less regrowth. Pinching is the usual term used for the removal of the tip of current season's shoots while heading is the term used to describe cutting current season's shoots back to 4 or 6 mature leaves. Stubbing usually refers to the cutting of upright shoots back to about 3/4 to 1 1/3 cm above the base, leaving a short stub.

Other benefits of summer pruning besides restricting vegetative growth and induction of flower buds include improved light penetration thus leading to improved fruit color and improved fruit calcium content (Bramlage and Drake, 1978).

In today's modern orchard with increased numbers of trees per hectare, the state of knowledge of combining rootstock with cultivar to soil and management is not well-defined to end up with the perfect spacing. Thus,

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Fruit Crop Specialist, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

summer pruning can be a useful tool in the containment of fruit trees (Crowe, 1980).

METHODS: The main purpose of this trial was to hold down tree vegetation and maintain trees easily in allotted space while retaining fruit colour.

The trial was set up as a 2 x 4 Factorial with comparisons between summer and winter pruning using four popular cultivar/rootstock combinations.

The trees selected for this trial were at two locations - St. Joseph and Keswick. At the St. Joseph location, Spur McIntosh on Antinovka rootstock planted in 1973 at 4.3 m by 6.7 m spacing and Vista Bella on M26 rootstock planted in 1975 at 2.4 m by 4.3 m were chosen. The Spur McIntosh/Antinovka trees had a spread of 4 m while the Vista Bella/M26 trees were using the full 2.4 m allotted in the row. The trees selected at Keswick were Spur McIntosh/M111 at 3m by 5.5 m and Cortland/M7 planted in 1975 and spaced at 3.3 m by 6 m.

Three trees of each cultivar were selected for trial to compare summer pruning with winter pruning. Summer pruning was carried out during the last week of July and first week of August, 1981 after terminal growth had ceased. In the summer pruning process, all terminals with more than 15 cm of new growth were headed leaving about 5 cm of new tissue containing 4 to 6 leaves.

The only dormant pruning which these summer pruned trees will receive is for structure improvement or repair of breakage. Dormant pruned trees will receive no summer pruning.

RESULTS: Observations will be made in 1982 and future years on the amount of flowering, crop yield, fruit quality and size of trees.

REFERENCES: Bramlage, W. J. and Mack Drake. 1978. The Effect of Summer Pruning of McIntosh Apple Trees on the Calcium Nutrition and Postharvest Quality of the Apples. Fruit Notes. Vol. 43 #4. University of Mass. July/August 1978. p. 13.

Crowe, A.D. 1974. Effect of Time of Pruning on Performance of Red Delicious Apple Trees. Research Station. Annual Report. Kentville, N. S. p. 9-11.

Lord, W. J. and D. W. Greene. 1978. Apple Tree Response to Summer Pruning. Fruit Notes. Vol. 43 No. 4. Univ. of Mass. July/August, 1978. p. 8-12.

EVALUATION AND DEMONSTRATION OF A MIST BLOWER FOR USE IN LOWBUSH BLUEBERRY FIELDS - 1981[1]

PROGRESS REPORT

BY

S. MICHAUD[2] AND G. W. WOOD[3]

Abstract: A preliminary evaluation of the Automatic Mist Blower was carried out in three commercial blueberry fields known to have heavy infestations of blueberry maggot. This machine provided good insecticide coverage and excellent insect control was obtained, but more experimenting is still required to fully evaluate its potential.

INTRODUCTION: Lowbush blueberry growers have a continuing problem with insects and disease. In some producing areas, airplanes are used to apply insecticides and fungicides. This method of application, however, is not practical when fields are small or situated close to populated areas. In other producing areas of the Province, the use of airplanes is not economically feasible.

Boom sprayers are also used by some growers, but this requires extensive travelling over the field and they are not practical on rough grounds. Dusters are rapidly being phased out and so are the insecticides in dust form.

For the reasons mentioned above, an Automatic Mist Blower was purchased to evaluate and demonstrate. The equipment is mounted on the three-point hitch of the tractor, and has a hydraulic volute which allows the operator to control the elevation of the spray. The blower was equipped with a BeecoMist Spray Head, which has an an 80 millon stainless steel perforated sleeve.

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Blueberry Specialist, N. B. Department of Agriculture and Rural Development.

[3] Entomologist, Agriculture Canada, Fredericton.

The principle of mist blowing is to use air as a carrier. A centrifugal blower creates a high-powered blast of air. Droplets created by the Beecomist head are sent into the air blast and a high speed cloud of droplets is created. Because the chemical is broken down into finer droplets than would be obtained from conventional sprayers, more coverage is obtained with less active ingredients and less water is used.

METHOD: The 1981 evaluations were carried out at three locations: Tower Hill, Charlotte Co.; Richibucto, Kent County; and Tracadie, Gloucester Co. There were two applications at each site, which is the usual cultural practice. Four materials were used: Cygon 4E (dimethoate), Guthion 50WP (azinphos-methyl), Supracide 25E (methidation) and Imidan 50W (phosmet). Each material was sprayed on a 0.3 ha plot. (30 m x 100 m).

All insecticides were applied in water under 275 KPa pressure and a delivery of about 22 l/ha. The mist blower was equipped with an orifice disc # allowing coverage to 30 m. All applications were done under calm or very low wind conditions. Tower Hill applications were made on July 11 & 17, Richibucto applications on July 16 & 24 and Tracadie applications on July 23 & 30.

RESULTS AND DISCUSSIONS: The results are given in Table I. They are based on maggot counts in 5 one-litre berry samples taken randomly from each treated plot and a control at harvest time.

The three locations where the mist blower was demonstrated were quite different, ranging from rocky and hilly situations to flat areas. However, the hydraulic volute very effectively enabled the operator to keep the air blast reasonably parallel to the ground.

From the results obtained, it is evident that the degree of control was very good and there was adequate coverage of the field with insecticide.

Another advantage with this type of equipment is that a swath 30 m wide can be covered. This means less travelling over the field, and a saving in time and blueberries. Less water is also used and this can be important when water is not readily available or when spraying is required on a larger acreage.

TABLE I. EFFECT OF APPLICATION, USING AN AUTOMATIC MIST BLOWER, OF FOUR DIFFERENT INSECTICIDES FOR BLUEBERRY MAGGOT CONTROL IN LOWBUSH BLUEBERRY FIELDS IN THREE DIFFERENT LOCATIONS IN 1981 IN NEW BRUNSWICK

Location			Maggot Count/Litre		
	Control	Cygon	Guthion	Supracide	Imidan
Tower Hill	19.8	0.4	1.2	4.2	0.0
Richibucto	26.8	0.0	0.4	0.4	1.4
Tracadie	13.0	-	0.4	0.0	2.8

CONCLUSION: These preliminary trials show that the Automatic Mist Blower can give good coverage of the field and give good control of the blueberry maggot. It can be used in small or irregular fields where aerial spraying is not practical or possible. In larger fields, it requires less travelling and is therefore more efficient.

However, further trials and demonstrations are needed, and these are planned for next year. During the 1981 trials, the machine was equipped with an orifice disc giving adequate coverage up to 30 m.

Other orifice plates are available and some of them are reported to give adequate coverage up to 50 m. These will be included in further trials.

Comparisons will also be made with aerial spraying from the standpoint of both economy and efficiency.

Further trials will also include the evaluation of this equipment for fungicide applications in the control of blossom and twig blight.

PENNFIELD NATIVE BLUEBERRY IMPROVEMENT PROJECT

PROGRESS REPORT

BY

S. G. MICHAUD AND E. N. ESTABROOKS[1]

Abstract: An evaluation was established in the Pennfield area of Charlotte County to evaluate the effect of cultural practices on lowbush blueberry production in an area where yields have been gradually declining over the past 20 years.

INTRODUCTION: This project was started in 1980 and consisted of two trials. Trial one was to evaluate the effects of mulch and fertility. The second trial was established to evaluate the effect of pruning method and fertility.

METHOD: No special cultural practices were carried out at the site in 1981. The field was checked at bloom time; pollination was adequate and no blight was encountered. Plots were harvested on August, 1981 from the central 8 m^2 when 90% of the blueberries were ripe. Data was analyzed as a complete randomized block.

RESULTS: Fertility X Pruning Trial - (Table I). On average, burning with oil gave the best yield. No significant difference between the three methods of pruning was found. For the fertilizer, 35 kg/ha of nitrogen gave the best yields. No significant differences were observed (Table I).

Fertility x Mulch Trial - (Table II). The lowest level of fertilizer gave the best yield. The highest level decreased yield and the yields were not different for the zero and the middle fertilizer level. No differences were significant. In regards to mulches, woodchips had the lowest yields and sawdust the best with no mulch in between. There was no significant difference between woodchips mulch and no mulch, but those two were significantly different from sawdust mulch (Table II).

---

[1] Blueberry Specialist and Fruit Crop Specialist, respectively, New Brunswick Department of Agriculture and Rural Development.

TABLE I. EFFECT OF THREE METHODS OF PRUNING AND THREE LEVELS OF FERTILITY ON YIELDS (g/plot) IN NATIVE STANDS OF BLUEBERRIES IN 1981 IN NEW BRUNSWICK

Pruning Method	Fertility Level (kg/ha N) 0	35	70	Average
Mowing	390	560	240	397
Burning With Straw	200	650	430	427
Burning With Oil	480	450	800	577
Mean	357	553	490	467

Within any row or column, there are no significant differences.

TABLE II. EFFECT OF THREE TYPES OF MULCH AND FOUR LEVELS OF FERTILITY ON YIELDS (g/plot) IN NATIVE STANDS OF BLUEBERRIES IN 1981 IN NEW BRUNSWICK

Mulch	Fertility Level (kg/ha N) 0	30	60	90	Average
Woodchips	230	490	520	160	350a
No Mulch	380	560	400	280	405a
Sawdust	760	720	460	700	660b
Mean	457	590	460	380	472

Unless followed by different letters, there is no significant difference between average in any row or column.

DISCUSSION: In this study, fertilizer did not have a significant effect on yield. It should be noted that fertilizer induced weed growth to an extent that might have reduced blueberry growth and development. Different pruning methods did not have a significant effect on yield either. The experiment will be repeated in 1982; weed control will be used. The trial will be harvested again in 1983.

Application of sawdust mulch caused a significant increase of yield compared to woodchips and no mulch. Observations showed that shoots were slow growing through woodchips compared to the sawdust. At time of reporting, plants in the sawdust mulch form a mat. Fertilizer application promoted weed growth, but the mulches retarded weed growth; sawdust being the most effective. Since fertilizer had no significant effect on mulch treatment, sawdust may have kept moisture available to the blueberry plant, allowing better fruit development. This trial will be mowed in 1982 and weed growth will be controlled. Yield data will be collected in 1983.

No definite conclusions can be drawn at this time. Fertilizer, in both trials, did not cause any significant yield increase, but accelerated weed growth in the blueberry stand. Control of weeds should effect the blueberry yield. Sawdust mulch is effective, but does not last as long as woodchips, as the woodchips take longer to break down. Blueberry shoots will have had a chance to come through the woodchips by the 1983 harvest and yield data at that time will give us more information.

This trial will be maintained for two more cropping years to determine the long-term effects of the different cultural practices used.

REFERENCES: Trevett, M.F. Growth Studies of the Lowbush Blueberry. 1946-1957. Maine Agricultural Experiment Station, Bulletin 581, April, 1959.

Trevett, M.F. Observations on the Decline and Rehabilitation of Lowbush Blueberry Fields. Maine Agricultural Experiment Station, Miscellaneous Publication 626, April, 1956.

Michaud, S. and E. N. Estabrooks. 1980. Pennfield Native Blueberry Improvement Project, Adaptive Research Report, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development. p. 41-42.

WEED CONTROL IN WILD LOWBUSH BLUEBERRIES[1]

BY

D. J. DOOHAN[2]

Abstract: Velpar herbicide gave excellent broad spectrum weed control in lowbush blueberries. Injury to the crop at the lower rates tested was minimal when compared to increased yield of fruit.

INTRODUCTION: This report deals with the testing of Velpar and Asulox F herbicides on wild blueberry fields in New Brunswick in 1980 and 1981. The results of two trials are reported, one designed primarily to test treatments for control of meadowsweet *Spirea latifolia L.*, commonly known as hardhack, the second to test treatments for goldenrod, *Solidago spp.* However, the results reported also deal with a number of additional species.

Asulox F herbicide (a registered trade name of May & Baker Canada) was registered for control of bracken fern (*Pteridium aquilinum*) in wild lowbush blueberries in 1976. Growers and researchers alike had reported some control of certain species of goldenrod during the past several years.

Velpar (a registered trade name of E. I. DuPont du Nemours of Canada Ltd.) was developed as an industrial herbicide for non-agricultural land. Reports of blueberry tolerance along railroad tracks by company representatives led to extensive testing of this product throughout the Maritimes and the State of Maine. Trials were first conducted in New Brunswick in 1978 (Doohan) and have been ongoing since that time.

The research reported deals with rates of herbicide required to control the weeds commonly occuring in blueberry fields.

MATERIALS AND METHODS: Experiment 1 - Baillie, Charlotte County. Treatments were designed to determine the optimum rate of Velpar for control of meadowsweet (Table 1). (All rates discussed are active ingredient.) Velpar was applied to 15 m x 3 m

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Weed Specialist, New Brunswick Department of Agriculture and Rural Development.

plots on May 13, 1980, shortly after the burn operation. Meadowsweet had emerged 1.5-5 cm, vetch, yarrow, goldenrod and strawberry had emerged. Less than 10% of the blueberry sprouts had emerged.

Weed control and crop tolerance ratings were made throughout the summer, the two main dates being July 29th and September 24th, 1980. Observations on weed control consisted of actual counting of certain species and also visual comparison of stand and vigor of weeds in treated versus untreated areas. Plots were harvested by handraking on August 4, 1981. There were five replications in a randomized block design.

Experiment II - Jackson Road, Charlotte County. Velpar treatments were applied on May 15, 1980 after the burn but before blueberry or weed emergence. Asulox F, which had been reported to give some control of goldenrod, was applied to fully expanded foliage on August 13, 1981. The entire plot area was treated with 75 kg/ha of urea on May 21, 1980. Weed control and blueberry tolerance ratings were made on September 18 and 25, 1980. Plots were harvested on August 13, 1981 with a mechanical harvester. Weed control observations were made in the same manner as in Experiment I. There were five replications in a randomized block design.

RESULTS AND DISCUSSION: Experiment I

TABLE I. EXPERIMENT I, BAILLIE, CHARLOTTE COUNTY

TREATMENT KG/HA	# SPIREA	# SOLIDAGO	BLUEBERRY YIELD KG/PLOT
Velpar 2	11	0	5400
Velpar 4	6	0	3640
Velpar 8	1	0	640
control	836	144	5140

Velpar, at all rates tested, gave good control of most weed species present (Table I). Grasses, goldenrods, cinquefoils, wild strawberry and sheep sorrel were essentially absent from treated areas from the beginning of the season. Woody weeds such as meadowsweet, poplar and birch died slowly over the summer of 1980 and were completely absent from hexazinone plots in 1981. There was some apparent recolonization of the bare ground areas within plots by sheep sorrel and wild strawberry in 1981. Recolonization was by stolons from adjacent untreated areas. Velpar has a relatively short persistence in the soil and recolonization of bare areas in treated blocks may be a problem.

Woody weeds died slowly during the summer through a cycling process of defoliation and releafing.

Blueberry plant injury was noted at all rates of Velpar tested, ranging from minimal at 2.0 kg/ha to severe at 8.0 kg/ha. There was a reduction in yield at the 4.0 kg/ha rate when compared to the check. This was likely due to crop injury. Injury at this experimental site was more severe than recorded in any previous pre-emergence treatments of Velpar (Doohan, 1979, 1980).

Several contributing factors are indicated: (1) a higher than normal percentage (20-30%) of velvet-leaf blueberry, *V. myrtilloides*, in the total stand. The velvet-leaf blueberry has been shown in numerous reports to be considerably more sensitive to Velpar than the common blueberry, *V. angustifolium;* (2) ten percent of the blueberry sprouts had emerged from the ground at the time of application. Postemergence applications of Velpar have been reported very injurious to the crop (Jensen, et al, 1981). In this instance, the entire field may have been more sensitive to Velpar due to its stage of growth; (3) the site had an extremely stony-gravelly soil which would indicate a greater availability of Velpar to the crop in the soil water; (4) there was some injury on the common blueberry at all rates tested. The symptoms, marginal leaf burn, necrosis and defoliation mainly of the lower leaves, were restricted to certain clones.

Experiment II - As in Experiment I, excellent control of meadowsweet and goldenrod was obtained, this time with a low rate of 1.0 kg/ha Velpar (Table II). Control of other weed species was as follows:

TABLE II. EXPERIMENT II, JACKSON ROAD, CHARLOTTE COUNTY

TREATMENTS HERBICIDE	RATE KG/HA	YIELD G/30M^2	# SPIREA	# SOLIDAGO
Asulox F	2.0	880	357	318
Asulox F	4.0	1060	285	343
Velpar	1.0	4040	4	1
Velpar	2.0	3980	1	0
Velpar	4.0	3820	0	0
Check		1140	307	251
Check		740	285	444

Velpar 1.0 kg/ha - excellent control of pearly everlasting, hawkweed, yarrow, vetch, black medick, wild strawberry and cinquefoil (the last two re-established in 1981).

Velpar 2.0 kg/ha - complete control of poplar, good control of rhodora, injury on willow and bracken fern.

Velpar 4.0 kg/ha - complete control of rhodora, injury on willow, bracken fern and bunchberry.

The pattern of dying described for woody weeds in Experiment I was also observed in Experiment II.

Asulox F did not control any of the goldenrods. There was injury in the form of reduced growth and chlorosis. These symptoms were also observed on meadowsweet. Control of goldenrod might have been improved by an earlier application (Jensen, 1980).

Slight injury was observed at all rates of Velpar tested mainly on the velvet-leaf blueberry and certain clones of the common blueberry, however, overall, the Velpar treated plots were more vigorous than the check or Asulox F plots (Table II).

Yields from Velpar treated plots averaged twice the yield from untreated plots. This further indicates that injury from Velpar is insignificant when compared to the injurious effect of weed competition.

In both experiments, considerable bare ground occurred when weeds died in Velpar treated areas. A proportion of this ground was colonized by blueberry rhizomes and stems leading to an increased stand. (Trevett found that yield was very highly related to the number of blueberry stems per unit area.) However, a large proportion of this bare ground is subject to recolonization when residual Velpar is no longer present. Consideration should be given to this problem and to solutions such as tank-mixing Velpar with a more residual herbicide such as simazine or atrazine.

CONCLUSIONS: Velpar at 1-4.0 kg/ha controlled most of the herbaceous and woody weeds common to wild lowbush blueberries.

Minimal injury to the common blueberry was observed and more severe injury to the velvet-leaf blueberry occurred at all rates of Velpar. Certain clones of the common blueberry were observed to be more sensitive to Velpar than others. The extent of injury to the crop may be related to the timing of application and to soil type.

At the lower rates tested, 1 and 2 kg/ha Velpar, the crop injury was insignificant when compared to the increased yield obtained. The rate 4.0 kg/ha may be too high for locations with a very gravelly soil. Generally, the application of Velpar resulted in higher yields when compared to untreated plots. It is presently being considered for registration at 1-3 kg/ha and has the potential to revolutionize weed control in the blueberry industry. However, growers should proceed cautiously, testing Velpar on small areas first, determining the rates that work best in their fields. Extreme care should be given to calibration of spray equipment and to the actual spraying since over application could have very serious consequences.

Further work should be conducted to determine the effect of soil type, soil organic matter, timing of application, rainfall, etc., on weed control and crop tolerance.

ACKNOWLEDGEMENTS: The assistance of Serge Michaud, Blueberry Specialist, is greatly appreciated.

REFERENCES: Doohan, D. J. 1979. Control of Goldenrod and Hardhack in Native Stand Lowbush Blueberries. 1979 Adaptive Research Report. Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development, p. 39.

Doohan, D. J. 1980. Control of Meadowsweet (Hardhack) In Native Stand Lowbush Blueberries. 1980 Adaptive Research Reports. Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

Jensen, K.I.N. 1980. Personal communication.

Jensen, K.I.N., Doohan, D. J., Thomson, J. 1981. Weed Control In Lowbush Blueberries With Hexazinone. Proceedings North Eastern Weed Science Society. Vol. 35, p. 147.

Trevett, M. F. 1972. The Integrated Management of Lowbush Blueberry Fields. A Review and Forecast. Bulletin 699. Life Sciences and Agriculture Experiment Station, University of Maine at Orono. p. 16.

DEMONSTRATION OF ATRAZINE FOR WEED CONTROL FOR WILD LOWBUSH BLUEBERRIES[1]

PROGRESS REPORT

BY

D. J. DOOHAN[2]

Abstract: Twelve grower fields were sprayed with atrazine at rates of 4.5, 6.0 and 8.0 kg/ha after field burning but before blueberry sprout emergence in the spring of 1981. When applied according to directions, control of grasses and broadleaf weeds was good and no crop injury was observed.

INTRODUCTION: Atrazine was developed as a residual selective herbicide for corn by Ciba Geigy Corp. in the 1950's. Although mainly effective on a wide range of broadleaf annual weeds, it gives some control of perennial weeds, including quack grass, *Apropyron repens L.* Atrazine has been used safely for many years on corn, millet and a few other monocotyledonous crops. Trevett tested atrazine on blueberries in the late 1960's, and at rates of 0.6-5.6 kg/ha, it was found to inadequately control grass and sedge.

Further testing on blueberries was done in 1975-77 mainly on cultivated select clone plantings. These plantings were not injured by rates of 1 to 2 kg/ha of atrazine provided it was applied prior to bud break (Jackson, 1978). This work was discontinued in 1979 when the company appeared unwilling to register atrazine for blueberries. Simulataneously, atrazine at 1 and 2 kg/ha was tested on wild stands of blueberries for control of broadleaf herbaceous weeds. At these rates, it was not effective (Doohan, 1979).

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Weed Specialist, New Brunswick Department of Agriculture and Rural Development.

In 1979, a cooperative trial was conducted in New Brunswick, Nova Scotia and Prince Edward Island directed by the Atlantic Weed Science Committee. Atrazine was included in the treatments at 4 and 8 kg/ha applied after the burn but before blueberry sprout emergence. Control of grass and broadleaf weeds was good and a 50% increase in yield was recorded (Doohan, 1980). With these good results, the Atlantic Weed Science Committee in 1980 consulted with Ciba Geigy and the company agreed to register atrazine for blueberries provided there were no residues of atrazine in harvested fruit and all data were acceptable to Agriculture Canada, the registering authority. Federal and provincial weed specialists prepared a label recommending atrazine at 4.5 to 8.0 kg/ha to be applied in the spring after field burning. Fruit harvested in 1980 from the above-mentioned trials was analyzed by Agriculture Canada scientists at Kentville, N. S., and no residues were found at a detection limit of 0.002 ppm atrazine. In the spring of 1981, Agriculture Canada issued a grower research permit for Atlantic Canada allowing producers to apply atrazine at the recommended rates to plots of 2 to 3.5 ha for a total of about 30 ha in each province. A project was prepared and approved by the Technology Transfer committee of the Agricultural Subsidiary Agreement to provide financial support for this project.

MATERIALS AND METHODS: Several producers throughout the province were selected as co-operators. Atrazine was purchased through funds supplied by the Technology Transfer Program. The atrazine was delivered and the growers applied it to their own fields at rates of 4.5 to a high of 8 kg/ha. Application was supervised in some cases. Follow-up began in late July through October when all fields were checked.

RESULTS AND DISCUSSION: In most fields treated, atrazine gave excellent control of grasses. Atrazine gave nearly 100% control of goldenrod when compared to an adjacent section of field treated with terbacil. With the exception of marginal leaf burn at one site near Tracadie, no injury was observed on blueberries with up to 8 kg/ha of atrazine. In the one case of injury, the field had been treated with about 6 kg/ha atrazine and the damage was likely caused by applying the herbicide after the blueberry sprouts had emerged.

Full registration of atrazine for wild blueberries is expected for spring, 1982. Yield samples will be taken on several tested fields in 1982 and the final results will be published.

ACKNOWLEDGEMENTS: The assistance of Serge Michaud, Blueberry Specialist, in carrying out this demonstration project is gratefully appreciated.

REFERENCES: Doohan, D.J. 1979. Control of Goldenrod and Hardhack In Native Stand Lowbush Blueberries. 1979 Adaptive Research Reports. Plant Industry Branch, Department of Agriculture and Rural Development. p. 39.

Doohan, D.J. 1980. Herbicides for Lowbush Blueberries. Expert Committee on Weeds, Research Report. Eastern Section 1979. p. 439.

Jackson, L.P. 1978. A Field Program For Select Clone Blueberry Plants. Research Report. Nappan Experimental Farm. p. 106.

Trevett, M.F., Durgin, R.E. 1972. Terbacil: A Promising Herbicide for the Control of Perennial Grass and Sedge in Unplowed Lowbush Blueberry Fields. Research In the Life Sciences. Vol. 19 #15.

VELPAR HERBICIDE AND FERTILIZER FOR WILD LOWBUSH BLUEBERRIES[1]

DOUGLAS J. DOOHAN[2]

Abstract: The yield of fruit was higher when Velpar herbicide and urea fertilizer were used together on wild lowbush blueberries.

INTRODUCTION: Chemically fertilizing wild lowbush blueberries has historically not been a common practice. Although it has been recognized since 1933 that fertilizing has potential to increase fruit production (Chandler and Mason) growers have been reluctant to fertilize their fields because it increases weed competition. In fact in many situations the increased weed growth due to fertilizing has actually resulted in decreased yields.

The weeds associated with wild blueberries are those usually found in land reverting back to forest; grass, sedge, broadleaf perennials such as goldenrod, asters, pearly everlasting, wild strawberry and a variety of brush species such as hardhack, lambkill, poplar, birch, willow.

In 1978 the Plant Industry Branch started a program to evaluate a number of herbicides for wild blueberries. The long term objective was to develop techniques to control the problem broadleaf perennial weeds and brush species.

Several herbicides were evaluated as roller applied treatments. A blueberry weed roller applies a non-selective herbicide to weeds taller than the blueberry vines. In addition a number of selective herbicides were applied with a plot sprayer. Of all the weed control treatments tested a DuPont industrial herbicide, Velpar, gave excellent control of a large number of weeds; grass, broadleaf perennials, and brush. When applied after the burn prune but before blueberry sprout emergence no significant crop injury was observed at rates of 1 to 3 kg/ha. (Doohan, 1980).

---

[1] Financially supported by the Technology Transfer Program

[2] Weed Specialist, Plant Industry Branch, N.B. Dept. of Agriculture.

Velpar controlled weeds sufficiently that it was decided to test it together with fertilizer.

MATERIALS AND METHODS: Five split plot unreplicated experiments were established throughout the province in spring 1980. Simply stated each experiment consisted of four rates of Velpar 0, 1, 2 and 4 Kg/ha (all herbicide rates are active ingredient) and 3 rates of urea 0, 45 and 90 kg/ha applied at right angles to the Velpar spray treatments.

Observations on weed control and crop tolerance were made throughout the summer and yields were harvested from 2 plots in August 1981. Of the 3 remaining plots, 2 were mistakenly harvested by the grower and the third was ommitted from the trial because the plot had not been burned prior to Velpar application.

RESULTS AND DISCUSSIONS: Weed control with Velpar was excellent on all 5 experiments. At one site severe crop injury was observed. A very high water table (25 to 40 cm from the surface) may have resulted in toxic rates of Velpar being absorbed by blueberry roots, leading to injury.

At Stewarton Corner (Table 1) both urea and Velpar when applied separately gave higher yields than untreated plots, however the best yields were obtained on plots treated with urea at 45 and 90 kg/ha and Velpar at the 1 kg/ha rate.

At Cowan's Creek, Table II, plots treated with Velpar alone yielded better than the untreated plot. When fertilizer was used alone the yield was lower than the untreated plot. This was likely due to increased weed competition. The best yields were obtained with 2 Kg/ha Velpar and 45 and 90 Kg/ha urea.

At Stewarton the increased yield seems to be associated with an increased stand of blueberry stems. However, this does not appear so at Cowan's Creek. From both site it appears that minimal injury to the crop does not effect yield.

The higher rate of Velpar required to maximize yields at Cowan's Creek may be related to observations made in other experiments, that the performance of Velpar varies with different soil type and environmental conditions (Doohan, 1980).

TABLE I

VELPAR AND UREA AT STEWARTON, NEW BRUNSWICK

VELPAR kg/ha a.i.	UREA kg/ha	% PLANT COVERAGE	% STAND INJURED	% INJURY	% WEED CONTROL	YIELD $g/4m^2$
0	0	55	0	0	0	1300
0	45	40	0	0	0	4600
0	90	50	0	0	0	3400
1	0	75	0	0	85	4450
1	45	80	0	0	85	8200
1	90	75	0	0	85	8600
2	0	75	10	20	95	3000
2	45	75	10	20	95	4200
2	90	65	10	15	95	5250
4	0	60	25	30	100	2800
4	45	70	15	20	100	5700
4	90	60	25	30	100	6400

TABLE II

VELPAR AND UREA AT COWAN'S CREEK, NEW BRUNSWICK

VELPAR kg/ha a.i.	UREA kg/ha	% PLANT COVERAGE	% STAND INJURED	% INJURY	% WEED CONTROL	YIELD $g/4m^2$
0	0	60	0	0	0	4100
0	45	60	0	0	0	2800
0	90	60	0	0	0	3300
1	0	55	0	0	80	1100
1	45	55	0	0	80	1200
1	90	55	0	0	80	3800
2	0	55	5	5	90	2900
2	45	55	5	5	90	5100
2	90	55	30	25	90	6400
4	0	60	10	10	80	2600
4	45	60	10	10	80	1700
4	90	60	30	25	80	2600

CONCLUSION: Weed control with Velpar herbicide offers bleuberry growers the potential to successfully use fertilizer on their fields and th successfully use yield from both better weed control and improved fertility.

ACKNOWLEDGEMENTS: The assistance of Extension Horticulturist, Geatan Chiasson, Blueberry Technician Stan Wentzell and co-operative growers in carrying out these experiments is gratefully appreciated.

REFERENCES: Chandler, F.B.; Mason, I.C. 1933. Effects of Fertilizer Native Maine Blueberry. Proceedings of the American Society for Horticultural Science. Vol 50, p. 297.

Doohan, D.J. 1980. Control of Meadowsweet (Hardhack) In Native Stand Lowbush Blueberries. Adaptive Research Reports 1980. Plant Industry Branch, Department of Agriculture and Rural Development, p. 26-28.

Doohan, D.J. 1980 Control of Meadowsweet (Hardback) in Native Stand Lowbush Blueberries. Adaptive Research Reports 1980. Plant Industry Branch New Brunswick Department of Agriculture and Rural Development p. 26.

Doohan, D.J. 1980 Evaluation of Blueberry Weed Roller 1980. Adaptive Research Report. Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development p. 30.

Doohan, D.J. 1980 Control of Goldenrod in Lowbush Blueberries, 1980. Adaptive Research Report. Plant Industry Branch. New Brunswick Department of Agriculture and Rural Development, p. 37.

CULTIVATED LOWBUSH BLUEBERRY DEMONSTRATIONS[1]

PROGRESS REPORT

BY

S. G. MICHAUD[2]

Abstract: From 1976 to 1978, six cultivated lowbush blueberry demonstrations, each 0.8 hectares in size, were established across the Province. Details as to operations performed on the demonstrations and observations of performance are given.

INTRODUCTION: The six cultivated lowbush blueberry demonstrations are now established. All plantings are on a production record system and the first yield data is coming in. Valuable information on plant establishment was collected from the different locations and more is still to come.

OBSERVATIONS: Two plantings (1.6 ha) were burned in the spring using a propane burner. Damage resulted to plants that had heaved out by killing the central core. Where no rhizome growth had started, the plant was completely dead while the plants with rhizomes showed new shoot growth.

A total of 2.4 ha were pruned using a flail mower. These will be fruited next year. All these received a herbicide application of simazine and terbacil in early May. Weed control varies from poor to good; perenial weeds being the most serious problem. Misses were replaced in four of the plantings.

Fertilizer was applied to 1 ha (split on two plantings) on fields in their sprout year. The effect should show next year on harvest. Mulch has been applied on 1 ha also covering part of two plantings.

---

[1] Financially supported by Technology Transfer, A.S.A. II.

[2] Blueberry Specialist, New Brunswick Department of Agriculture and Rural Development.

Two plantings were scheduled to be harvested this summer. One planting (0.5 ha) was destroyed by birds before harvest. Data collected on the second planting is presented in Table 1. These two plantings will be harvested again next year and the data will be compared with the first year fruiting field.

TABLE 1: Yield data from 1977 and 1978 plantings harvested in August 1981 in Elgin, New Brunswick.

	Yield (kg/ha)
1977 planting	
Clone 206	146
Me2 O.P.	2018
Me451 x Me2	1182
74-19	1746
Me4161 x 698	346
Me2 x 508	564
Me4161 O.P.	1000
Me2 x 325	782
1978 planting	
Mixed seedlings	2835

In the 1977 planting, a 18 m section was harvested in each row; since each row consisted of one individual clone. Yield is given in kg/ha.

The 1978 planting consisted of 0.1 ha. Blueberries were harvested on 0.05 ha and the yield is given in kg/ha for the area harvested. Better weed control and higher fertility level in this second planting show up in better yields compared to the 1977 planting.

From observations made on the demonstration plantings during the 1981 season, weed control is still the major problem. Even though some weeds are controlled by the existing herbicides, some are not and are getting to be a real problem (vetch, wild roses, creeping buttercup). Mulch has been applied to parts of two plantings, but applying it to plantings that are four years old means running over some of the fruiting plants or over plants with fruit buds. Mulch should definitely be applied in the first or second year after planting.

Diseases will also have to be addressed in the future especially if the plants are fruited for more than one year in a row.

Production records were kept, but more data is still needed especially on the economics of cultivated lowbush blueberry production.

Program for 1982:

Data on yields should be obtained on four of the plantings. A closer study of pest problems will be carried out. If weed control can be successfully achieved, fertilizer will be added. Further mulching on the remaining plantings will also be done.

Communication and Extension Thrust:

A workshop for growers planting cultivated lowbush blueberries was organized in March 1981. A special newsletter was put out. A growers' tour was organized to Kentville in order to show them what to expect since our plantings are still not at a full production level. Presentation of information was made to other producer groups. The preliminary set of guidelines should be revised in winter 1981-82.

SUMMARY: These demonstration plantings have helped in keeping ahead of the growers. Even though many problems still remain to be solved, it can be said that these plantings have helped a great deal by giving us information on how to manage cultivated lowbush blueberries under different conditions. They are now at a stage where yield data is starting to be collected and growers are more keen to know what is happening.

REFERENCES: Dykeman, B.W., 1979. Cultivated Lowbush Blueberry Demonstration, Adaptive Research Report, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development, p. 15-17.

CULTIVATED LOWBUSH BLUEBERRY FERTILITY TRIAL

PROGRESS REPORT

BY

S. G. MICHAUD, I. GHANEM, K.T.V. MICHALICA
AND R. BUCHANAN[1]

Abstract: A trial was established at the Horticultural Centre in Hoyt in order to determine the optimum fertilizer recommendations for use in cultivated lowbush blueberries in establishment years.

INTRODUCTION: In the past no fertilizer has been used on cultivated lowbush blueberry plantings. The main reason for this was that weed control problems made it impossible to use fertilizer. Since this has been resolved and new herbicide recommendations have been developed, fertility can now be studied.

It is the intent of this project to determine if fertility is a limited factor in the plant establishment of cultivated lowbush blueberries. It will also study the effect of different fertilizers, rates of fertilizer and dates of application on plant estabishment and development. Finally the information collected will be used in fertilizer recommendations that can be used for commercial plantings.

METHOD: The blueberry fertility trial was set up at the Horticultural Centre in Hoyt, in April 1981. The trial consisted of four relications with 15 treatments (Table I).

All plants were spaced as in a commercial planting (45 cm x 90 cm) with a total of 12 plants per row. Cuttings from the clone Chignecto were used in the treatment row. Treatment rows were separated by two guard rows. The trial was established in a complete randomized block design.

Two types of fertilizer were evaluated, amononium sulfate (20% N) and sulphur coated urea (32% N). A Gandy Line Tender was used to apply fertilizer in all

---

[1] Blueberry Specialist, Soil Specialists and Soils Technician respectively, New Brunswick Department of Agriculture and Rural Development.

TABLE 1. TREATMENTS IN CULTIVATED LOWBUSH BLUEBERRY FERTILITY TRIALS ESTABLISHED IN HOYT, N.B. IN 1981

TREATMENT #	RATE PER APPLICATION NITROGEN (kg/ha)*	DATES OF APPLICATION			Total application N (kg/ha)
		1st Application	2nd Application	3rd Application	
1	5.5	May 22,1981	-	-	5.5
2	5.5	"	June 15,1981	-	11.0
3	5.5	"	"	July 2,1981	16.5
4	11.0	"	-	-	11.0
5	11.0	"	June 15,1981	-	22.0
6	11.0	"	"	July 2,1981	33.0
7	16.5	"	-	-	16.5
8	16.5	"	June 15,1981	-	33.0
9	16.5	"	"	July 2,1981	49.5
10	22.0	"	-	-	22.0
11	22.0	"	June 15,1981	-	44.0
12	22.0	"	"	July 2,1981	66.0
13	55.0 SCU	"	-	-	55.0
14	33.0	"	-	-	33.0
15	C (Control)	-	-	-	0

* Nitrogen was applied as ammonium sulfate in treatments as #1 through 12 and treatment #14. Nitrogen was applied as sulphur coated urea in treatment #13.

treatments. This machine side dressed the rows at 5 cm from the planted row, incorporating the fertilizer into the soil to prevent volatilization.

The entire trial was mulched with sawdust (5 cm thick) and irrigation was used as needed. Weed control was maintained.

DISCUSSION: All plants grew well through the season. No losses occurred. There was no major difference in length of growing period or length of shoots.

Observations to be taken in 1982 include: plant survival, plant establishment, shoot growth, plant spread, length of growing period, rhizome and root system development.

PLANTING OF LOWBUSH BLUEBERRY CLONES IN SOD
PROGRESS REPORT
BY
S. MICHAUD AND E. N. ESTABROOKS[1]

Abstract: A project initiated in 1980 to study the establishment and production of cultivated lowbush blueberry clones planted in herbicide treated and non-herbicide treated sod was continued.

INTRODUCTION: In spring 1980, cultivated lowbush blueberry seedlings were transplanted in a lightly grassed sod field. Half of the planted area was treated with glyphosate (Roundup) at 2 kg/ha.

METHOD: The planting was observed in spring 1981 for frost heaving and plant survival. The planting was managed the same as the surrounding native stand blueberry field and no special cultural practices were used. Plants were observed in the fall for height and rhizome development. Rhizome development was evaluated by digging 10 plants selected at random in each area.

RESULTS: No heaving was noticed on either section of the planting. Survival rate was 91% in the treated area while that in the untreated sod was 77% (compared to 98% and 80% in fall '81). Both areas were equally covered with grasses and sedges by the end of the summer. Growth was again better in the treated area with an average 10.6 cm compared to 6.6 cm in the untreated area. Rhizome growth was present in seven of the ten plants dug in the treated area while it was present in three of the ten dug in the untreated area.

CONCLUSION: Even though no heaving was experienced in the sod planting, this cannot be used to generalize since a survey of other plantings in clean cultivated fields throughout the province did not show major heaving problems this year. Looking at plant growth and rhizome development, it appears that the cultivated lowbush blueberry plants established better in the herbicide treated area.

---

[1] Blueberry Specialist and Fruit Crop Specialist, respectively, New Brunswick Department of Agriculture and Rural Development.

Next spring, the entire planting will be pruned by burning and weed control will be applied, as part of normal cultural practices to the field. Plant survival and growth will be assessed in 1982. First crop scheduled in 1983.

BLUEBERRY CLONE EVALUATIONS

PROGRESS REPORT[1]

BY

B. W. DYKEMAN[2]

Abstract: A continuing program of evaluating blueberry clones for their suitability to New Brunswick conditions is reported. In 1980, records on bloom dates, winter injury and fruit characteristics were kept.

INTRODUCTION: Each year, over sixty clones of lowbush and half-highbush blueberries which are grown at the New Brunswick Horticultural Center are evaluated for growth habits which will affect their adaptability to New Brunswick. These evaluations are not replicated trials but simply observations which will be made over a number of years.

Characteristics which are important to New Brunswick are the bloom dates and winter hardiness, as well as productivity and fruit quality. The lowbush blueberry is a plant which blooms while the chance of spring frosts is still high throughout much of New Brunswick. Therefore, in the selection of suitable clones, late blooming types are of real value. Also, winter hardiness is a characteristic which varies among clones and one which is of major importance in selection for New Brunswick production.

1981 RESULTS: Table I gives some of the results of the 1981 observations. Due to very high temperatures in mid-May, the period of 50% bloom was very concentrated with only a seven-day spread compared to 12 days in 1980 (Dykeman, 1980). Fifty percent bloom ranged by May 25th to June 1st.

All clones came through the 1980-81 winter with little or no dieback or fruit bud injury.

The fruit weights and flavour evaluations were again carried out and are presented in Table I. Many of the

---

[1] Financially supported by Technology Transfer Program, Agricultural Sub-Agreement II.

[2] Horticulturist, New Brunswick Department of Agriculture and Rural Development.

sharp differences in flavour ratings between 1980 and 1981 may be due to the fact that evaluations were carried out by different individuals each year.

TABLE I. BLOOM AND FRUITING OBSERVATIONS ON SELECTED BLUEBERRY CLONES, 1981.

Clone	Date of 50% Bloom	Spread In Bloom Period	100 Berry Weight (g)	Flavour (1-3 scale)
Augusta	May 25	0	73	2
Chignecto	May 25	0	45	2
Brunswick	May 25	0	36	2
Me3	May 25	0	39	2
315	May 25	0	38	3
451	May 25	0	32	2
206	May 25	0	35	1
704	May 29	4	48	2
632	May 29	4	45	2
510	May 27	2	44	2
372	June 1	7	-	2
512	May 25	0	40	3
682	May 25	0	46	3
670	May 25	0	-	-
70-62	May 25	0	66	2
70-95	May 27	2	42	1
74-8	May 25	0	46	3
74-2	May 25	0	70	2
Minn 3	May 29	4	160	2
Minn 135	June 1	7	181	2
Minn 327	June 1	7	-	-
Minn 354	June 1	7	-	-
Minn 350	May 29	4	93	2
Me 1	May 29	4	-	-
Minn 360	May 29	4	-	-
Minn 332	June 1	7	-	-
Minn 84	-	-	180	2

REFERENCES: Dykeman, B.W. 1976. Blueberry Clone & Seedling Evaluations. 1976 Research Report. New Brunswick Agriculture.

Dykeman, B.W. 1977. Blueberry Clone & Seedling Evaluation Program. 1977 Research Report. New Brunswick Agriculture.

Dykeman, B.W. 1980. Blueberry Clone Evaluations. 1980 Adaptive Research Report. New Brunswick Agriculture. p. 45-48.

CULTIVATED LOWBUSH BLUEBERRY CROP SCHEDULING STUDY[1]

BY

S. MICHAUD AND B.W. DYKEMAN[2]

Abstract: The project initiated in 1980 to determine the optimum crop scheduling system for cultivated lowbush blueberries was continued. Early yield data is reported.

INTRODUCTION: This study was started in 1980 with two specific objectives: 1) To determine the ability of select clones to fruit economically two years or more before pruning. 2) To determine the optimum scheduling system for cultivated lowbush clones.

The study was carried out according to the proposed harvesting schedule drawn up in 1980 and three of the four treatments were harvested in 1981.

METHODS: According to the harvesting schedule (Dykeman, 1980), treatment #2 was pruned in spring 1981. Older wood was removed by hand in treatment #4, Selective Pruning. Treatment #1, 3 and 4 were harvested when the blueberries were 90% ripe.

RESULTS AND DISCUSSIONS: Table 1 gives the results of both 1980 and 1981 data. Of the five clones used in this experiment, all except Chignecto are considered to be vigorous clones and will produce more vegetative growth even in the fruiting year. Chignecto tends to be highly productive on the first fruiting year but does not produce many shoots and fruit buds if not pruned. For this reason, two averages have been made; Average B excluding Chignecto.

---

[1] Financially supported by Technology Transfer Program, A.S. A. II.

[2] Blueberry Specialist and Horticulturist respectively New Brunswick Department of Agriculture and Rural Development.

Looking at Average B, 1981 data, the triennial prune has a higher yield than the biennial prune, showing that these clones are still productive on their second year of fruiting. If we compare 1980 and 1981 data for triennial pruning, it shows that yields are again higher in the second year of fruiting. Comparing 1980 and 1981 data for the selective prune, the yields are quite similar.

Table I. Harvest Data From Three Cropping Systems for Cultivated Lowbush Blueberry

Clone	System	Yield (1980) Kg/Ha	Yield (1981) Kg/Ha
Chignecto	1. Biennial Prune #1		9,182
	2. Biennial Prune #2	4,136	-
	3. Triennial Prune	3,548	2,625
	4. Selective Prune	5,519	9,636
74-8	1. Biennial Prune #1	-	1,997
	2. Biennial Prune #2	3,920	-
	3. Triennial Prune	3,489	2,439
	4. Selective Prune	3,749	2,153
206	1. Biennial Prune #1	-	938
	2. Biennial Prune #2	835	-
	3. Triennial Prune	795	2,600
	4. Selective Prune	1,277	2,686
74-7	1. Biennial Prune #1	-	1,353
	2. Biennial Prune #2	685	-
	3. Triennial Prune	974	2,382
	4. Selective Prune	1,927	1,369
74-14	1. Biennial Prune #1	-	689
	2. Biennial Prune #2	548	-
	3. Triennial Prune	599	1,026
	4. Selective Prune	534	1,700
Average A (All 5 clones)	Biennial Prune #1	-	2,832
	Biennial Prune #2	2,025	-
	Triennial Prune	1,881	2,214
	Selective Prune	2,601	3,509
Average B (Excluding Chignecto)	Biennial Prune #1	-	1,244
	Biennial Prune #2	1,497	-
	Triennial Prune	1,464	2,112
	Selective Prune	1,872	1,977

Looking at each individual clone, Chignecto is very productive in its first fruiting year, but is very poor in its second year. This is a general trend which Chignecto has shown in past experiments. Selective pruning appears to be beneficial.

Clone 74-8 was down in production overall in 1981 compared to 1980. Even so, the data for 1981 shows yields in the triennial prune to be higher than the biennial prune.

Clones 206, 74-7 and 74-18 show the same type of results with the triennial prune giving better yields in 1981 compared to 1980. The yields in the triennial prune for 1981 were also superior to the 1981 biennial prune. The selective prune treatment is not consistent with the three clones but the yields still make this system interesting at this point.

No definite conclusions can be drawn at this time from the information collected. It appears that a triennial prune gives better yields in the second fruiting year, but this is on relatively young plant material. This study will be carried for 6 more years to see if this trend continues as the plants get established. The selective pruning also has to be evaluated on a longer period of time to see if yields show any large variations.

Interpretation of these results using statistical analysis cannot be done since the treatments were not replicated.

REFERENCES: Dykeman, B.W. and S.G. Michaud, 1980, Cultivated Lowbush Blueberry Crop Scheduling Study, Adaptive Research Report, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development, p. 49-52.

TRICKLE IRRIGATION AND MULCHING OF CULTIVATED BLUEBERRIES

LOWBUSH AND MID-HIGHBUSH[1]

PROGRESS REPORT

BY

B. W. DYKEMAN AND S. G. MICHAUD[2]

Abstract: A study initiated in 1980 at the New Brunswick Horticultural Centre, Hoyt, to evaluate the effects of irrigation and mulching on the growth and development of cultivated lowbush blueberries and mid-highbush blueberries was continued.

INTRODUCTION: This is a replicated study which was undertaken to determine the extent to which cultivated blueberries respond to irrigation and mulch under New Brunswick conditions.

METHODS: A list of the complete details of this study has already been given (Dykeman, 1980). For 1981, irrigation was applied as required, but due to the extensive rainfall, little additional irrigation was necessary.

Yield data will be available from the mid-highbush in 1982 and from the lowbush in 1983.

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Horticulturist and Blueberry Specialist, respectively, New Brunswick Department of Agriculture and Rural Development.

MID-HIGHBUSH BLUEBERRY CLONE EVALUATION
PROGRESS REPORT
BY

B. W. DYKEMAN AND S. G. MICHAUD[1]

Abstract: Testing of the Minnisota hybrid selections of Vaccinuim angustifolium X V. corymbosum was started in 1976. Due to problems with the initial planting, a second trial was established in 1980 to evaluate these half-high or mid-highbush clones.

INTRODUCTION: The objective of the trial was to evaluate the potential of these clones for adaption to New Brunswick. If the clones are both hardy and productive under New Brunswick conditions, they could prove to be very valuable as a fresh market and pick-your-own fruit.

METHODS: In 1980, nine clones were planted in a randomized block design with four replications. Six plants per plot were used at a spacing of 1.0 m x 2.0 m. The planting was mulched in November of the planting year.

In 1981, the plants were pruned selectively, fertilized and irrigation was applied when required. Data on fruit bud counts, plant survival, bloom dates and yields will be available in 1982.

---

[1] Horticulturist and Blueberry Specialist, respectively, New Brunswick Department of Agriculture and Rural Development.

THE EFFECT OF CULTURAL SYSTEM ON STRAWBERRY YIELDS

BY

EVANS ESTABROOKS, R. BUCHANAN, I. GHANEM[1]

Abstract: A field trial was established in 1981 to evaluate the effect of plant density of strawberry and the degree of restriction of daughter plants on yield under the matted row cultural system. Plant densities varied from 12,350 to 123,500 plant/ha. Free runnering daughter plants are being compared with those restricted to 0, 5 and 10 daughter plants per plant. The raised bed system is also compared to the matted row system. The trial is well established and yield data will be collected for the 1982 season.

INTRODUCTION: Differences in strawberry yields have been noted and attributed to variations in plant density and cultural system. The raised bed system which has been accepted in California has produced higher yields than the traditional matted row system practiced in New Brunswick. Plant population of mother or daughter plants is expected to be an important factor in determining yields.

Thus, the need to determine the optimum plant population under local conditions is evident. The objective of the project is to compare the effects of the following factors on strawberry yields:

a) Plant densities and number of daughter plants under the matted row cultural system.
b) The cultural system; the matted row system versus the raised-bed system.

MATERIALS AND METHODS: The trial consisted of five treatments as outlined in Table I. Each treatment was replicated four times.

The trial was conducted at the N. B. Horticultural Center. Soil analysis indicates that soil is high in phosphorus, and potassium with pH 5.9. Fertilizer was applied at a rate of 450 kg/ha of 15-15-15 and incorporated in the soil prior to planting.

Nitrogen was applied six weeks after planting at the rate of 100 kg of urea per hectare.

---

[1] Fruit Crops Specialist, Soil Technician and Soil Specialist, respectively, New Brunswick Department of Agriculture and Rural Development.

TABLE I. TREATMENTS

TREATMENT	SYSTEM	NO. OF MOTHER PLANTS/HA	NO. OF RUNNERS PER PLANT
1	Matted row - free runners	12,350	Non-restricted
2	Matted row - restricted runners	12,350	10
3	Matted row - restricted runners	24,700	5
4	Unit plant	123,500	0
5	Raised-bed - restricted runners	24,700	5

The recommended pesticide spray program was applied to control weeds and plant diseases. All plants were deblossomed with the exception of treatment #4 (high density planting). The number of daughter plants per plant was restricted according to the plot plan.

RESULTS AND DISCUSSIONS: Yield data was collected this year for treatment four (high density planting) and recorded in Table II.

TABLE II. YIELD DATA FOR HIGH DENSITY PLANTING

REPLICATE	YIELD g/ 6 Meter Row	YIELD Kg/ha
1	2191	3043
2	1331	1849
3	2753	3824
4	1494	2075
Average	1942	2698

In the 1982 season, yield data will be collected for all treatments. The effect of different plant densities and cultural system on yield will be evaluated.

REFERENCES: Rorothoff, W. Challenging Practices, Systems and Thoughts for the '80's. Proceeding and added information from the National Strawberry Conference, 1980. p. 77-83.

Craig, D. L. Effect of Plant Spacing on Fruit Production From the Strawberry Cultivar Bounty. Kentville Research Station, Annual Report 1974. p. 52-53.

PROGRESS REPORT ON STRAWBERRY CULTIVAR TRIAL

BY

E. N. ESTABROOKS[1]

Abstract: Six new promising strawberry cultivars and selections were fruited and compared with six popular commercial cultivars being grown in the Province. Records of fruit production and growth characteristics were made.

INTRODUCTION: In recent years, a number of promising new strawberry cultivars with characteristics of improved yields, flavour, shipping quality or pest resistance have been introduced. Under New Brunswick conditions, an additional characteristic of being able to withstand the sometimes severe and changeable winters is required. Evaluation under New Brunswick conditions is required to determine winterability.

METHODS: In 1980, a strawberry cultivar trial of 12 cultivars was established at Jemseg on gravelly loam soil. The trial contained the six main cultivars now being grown in the Province - Veestar, Redcoat, Vibrant, Micmac, Sparkle and Bounty along with new releases from the Horticultural Research Institute of Ontario (cultivars Veegem, Veeglow and Vantage) and three selections from Agriculture Canada, Kentville (K72-8, K74-5 and Kent).

The strawberry cultivars were planted out in three replications in rows 7 m long at a spacing of 135 cm between rows and 45 cm between plants. Records of plant growth characteristics and fruit yields were made. Samples of fruit were taken at harvest for a sensory evaluation.

RESULTS: Records as to the number of daughter plants per mother plant were taken in early spring along with the percent of plants with multiple crowns. The most prolific runner producers were Micmac, Veestar, Kent, Vibrant, K72-8 and K74-8 from a high of 22 daughter plants per mother for Micmac down to 7 daughter plants for Vantage (Table I). The average percentage of plants with multiple crowns varied between cultivars from 21.6 for K72-8 to 7.6% for Sparkle. Bloom date information showed a spread of 9 days between cultivars. Similarily, first harvest differed by 10 days according to cultivar. It appeared that some cultivars have a concentrated bloom and fruiting period while others were spread out over a long period.

---

[1] Fruit Crops Specialist, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

TABLE I. PLANT GROWTH CHARACTERISTICS FOR TWELVE STRAWBERRY CULTIVARS GROWN AT JEMSEG NEW BRUNSWICK 1981

Cultivar	Ave.No. of Daughter Plants Per Mother	Ave. % Multiple Crown	Bloom and Harvest Dates	
			1st Bloom	1st Harvest
Micmac	22.1	8.7	May 30	July 2
Veestar	20.6	12.9	May 23	June 23
Kent	19.6	9.9	May 29	June 27
Vibrant	16.5	17.9	May 26	June 23
K72-8	14.5	21.6	May 30	July 2
K74-5	14.1	10.9	May 29	June 27
Veeglow	13.5	16.1	May 27	June 27
Sparkle	13.3	7.6	May 29	July 2
Bounty	12.7	15.4	May 31	July 2
Redcoat	12.1	17.7	May 26	June 27
Veegem	10.1	10.6	May 29	June 27
Vantage	7.2	16.0	May 29	July 2

Records taken on crop yield showed a great variation from a high of 17,931 kg/ha with the Kent cultivar to a low of 3,011 kg/ha with Veeglow (Table II). Average yield over all plots was 10,523 kg/ha.

TABLE II. CROP YIELD FOR TWELVE STRAWBERRY CULTIVARS GROWN AT JEMSEG, N. B. 1981

Cultivar	Yield (kg/ha)		Other Notes
Kent	17,931	*a**	heavy foliage, mid-season
K72-8	16,853	*ab*	late attractive fruit
Veestar	13,851	*bc*	early, high quality fruit
MicMac	12,672	*cd*	late, large fruit, light colour foliage
Sparkle	12,189	*cde*	late, small fruit
Vibrant	11,159	*cde*	mid-early season
Bounty	10,020	*def*	late season, few daughter plants
K74-5	9,544	*def*	mid-season
Redcoat	8,947	*ef*	mid-season
Veegem	7,066	*f*	mid-season, few daughter plants, weak
Vantage	3,038	*g*	late season, few daughter plants
Veeglow	3,011	*g*	mid-season

*Means followed by like letters are not significantly different at the 5% level of the NDMRT.

A sensory evaluation carried out by the Home Economics Branch of the N. B. Department of Agriculture in which the new selections were evaluated in comparison to Veestar showed a great diversity of opinion. In general, Kent and K74-5 came out high in overall evaluation.

The largest size fruit were found in the cultivars Kent, K72-8, K74-5, Bounty and Micmac while the smallest fruit was found in the cultivars Sparkle, Vibrant, Redcoat and Veeglow.

DISCUSSION: It is interesting to note that 5 out of the top 6 yielding cultivars were from plants which had produced a high number of daughter plants during 1980.

Multiple crown development has been associated with high yields. However, in this trial only 2 out of the 6 best yielding cultivars had high percent multiple crowns.

The low yield performance by the three new HR10 cultivars Veeglow, Vantage and Veegem can, in part, be explained by the difficult establishment in 1980. Plants of these cultivars used in this trial were spring dug and shipped by mail. Plants were slow to establish and did not develop a good row of plants by the end of the season. Other plants used in the trial were dormant plants or spring dug plants kept cool until planting.

In the spring of the fruiting year, there was some evidence of winter killing in the cultivars K72-8 and Sparkle. Plants of the Veegem, Veeglow and Vantage were generally weak in appearance.

CONCLUSIONS: The new strawberry selection Kent and K72-8 outyielded the six most popular commercial cultivars at a trial in Jemseg, N. B., during 1981. Based on one year's information, both of these culticars should be tried by growers wishing a mid or late season harvest. Veestar continues to be a good early season producer while the mid-season cultivars Vibrant and Micmac perform well. Sparkle produces many small size fruit for the late season but has limited market acceptance due to dark color of fruit. Cultivars should be fruited again to assess performance further. Cultivar assessment should also be carried out in other New Brunswick locations.

FINAL REPORT ON MECHANICAL STRAWBERRY HARVESTER EVALUATION[1]

BY

E. N. ESTABROOKS[2]

Abstract: A CMI strawberry harvester was brought to New Brunswick for demonstration and evaluation to determine the suitability for mechanically harvesting strawberries for processing. Although performance of the harvester was not completely satisfactory, it is believed with some changes to the machine and cultural practises that it could be made commercially acceptable.

INTRODUCTION: About two-thirds of the strawberries presently being grown in N.B. are now harvested by U-Pick. Twenty years ago strawberries for processing was a sizeable part of total strawberry production but today represent less than 5%. At present about one-half of the price received for processing strawberries by the farmer goes to harvest the crop making such an enterprise unprofitable. Mechanical harvesting of strawberries has been looked upon as a way to capture a portion of the large frozen strawberry market (25 million pounds imported annually into Canada) and as a means of getting a larger crop harvested for the processing market. Very few strawberry processors remain in the Atlantic Provinces and there is a danger that they will disappear if the volume of strawberries going to processing is not increased. An evaluation of the Canners Machinery Ltd. harvester in Michigan in 1978 and a North American conference on mechanical harvesting in 1979 lead to the conclusion that the CML harvester was the one most suitable for N.B. needs.

---

[1] Financially supported by Technology Transfer program, A.S.A. II.

[2] Fruit Crop Specialist, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

PROCEDURE: Arrangements were made in co-operation between Nova Scotia and New Brunswick governments to lease a mechanical strawberry harvester from Canners Machinery Ltd. for evaluation and demonstration in each province. An operator technician supplied by the manufacturer was used for all evaluations and demonstrations.

In 1979 a one acre planting of Veestar strawberries was planted at Stanley, N.B. for the trial. Row spacing and row shape were adjusted to accommodate the strawberry harvester. Original plans called for evaluation in 1980 but due to production problems the manufacturer could not deliver a harvester for trial and demonstration.

The test field was rolled in the spring of 1981 to improve smoothness of land and prevent stones from becoming a potential problem.

The strawberry harvester was brought into the field for testing and demonstration on July 13 and 14, 1981 at about the middle of harvest and 4 days after the last hand harvest.

Evaluation was made by counting potential fruit to be harvested in 6 random plots 3 meters long followed by the harvest and by determining the amount of fruit harvested and the amount left in the plot. Records were also made as to the harvester speed and other characteristics. Arrangements were made to deliver mechanically harvested fruit to a processor in Nova Scotia where a special dehuller and handling equipment was established for evaluation. Strawberry growers and other interested persons were invited to view the harvester working in the field on July 14, 1981.

RESULTS: The rows of plants carrying the fruit were about 90 cm wide, whereas the picking head on the harvester was only 75 cm. wide. Fruits outside the picking head area were not harvested. It was also noted that some fruits laying on the soil were not being picked up by the harvester head. Some single fruit being elevated away from the head was tumbling back down and being lost on the ground (estimated 5% of that harvested). Negligible amount of fruit was being discharged out the back with the leaves.

The test results from the six randomly established plots of 3 meter showed that about 60% of the fruit was being harvested after a single pass and deposited into lug boxes.

Table 1 below summarizes the harvest result from plots established in the strawberry field being used for mechanical harvesting.

Table 1. Amount of Strawberries Harvested by a Single Pass of the CML Mechanical Harvester, Stanley, N.B., July, 1981

	Ave. Number of Fruit in 3 m plot		Ave. Wt. of Fruit in 3 m plot (kg)	
Total Fruit	238	% of total	2.57	% of total
Harvested	142	60	1.50	58
Left in Field	96	40	1.07	42

It was estimated that about half of the strawberries unharvested were left as a result of the row being wider than the picking head on the mechanical harvester.

The harvester travelled at 3.5 km per hour and could cover about .60 hectares per hour.

DISCUSSION: Although a planting of strawberries was made for the mechanical harvesting test, it appears that the field was not entirely suitable for the evaluation. The row width had developed wider than the picking head resulting in lost fruit on the outside of the row. Also the cultivar Veestar was not entirely suitable. Veestar tends to have a concentrated fruit maturity but the fruit stock sometime bend over with weight of fruit leaving some of the fruit on the ground and below the cutting level of the harvester. Fruit breeders and cultivar evaluators should be requested to come up with an improved cultivar for further testing.

With a relatively smooth field, rows kept to the width of the picking head and a cultivar with concentrated maturity and upright fruit stocks, the mechanical harvester appears capable of improved results. Some adjustment to the slope of the elevator on the harvester would likely result in less roll back of single fruit and improved harvest efficiency.

Reaction by strawberry growers to the demonstration of the mechanical harvester was generally negative due to the amount of high quality fruit left in the field. However, some growers including the co-operating grower could see how improvements to the field conditions and the mechanical harvester could improve the harvesting to the point where it could be acceptable for commercial harvest.

SUMMARY: A CML mechanical strawberry harvester was tested and demonstrated under New Brunswick conditions. Test results showed that about 60% of the fruit in the plots was harvested successfully. It was estimated that about half of the unharvested fruit left after a single pass of the harvester was as a result of the row width being wider than the picking head. It is believed that with some changes to the harvester and in field conditions that the harvester would be useful on a commercial basis.

ACKNOWLEDGEMENTS: The cooperative assistance of Dennis Foreman, Stanley, in providing a strawberry field for testing and demonstrating was appreciated. The helpful assistance of Chuck Everett, Ag. Engineer, N.B. Department of Agriculture in evaluating the harvester is also acknowledged.

EVALUATION OF HERBICIDES FOR WEED CONTROL IN STRAWBERRIES

BY

D. J. DOOHAN[1] AND E. N. ESTABROOKS[2]

Abstract: Several sequential herbicide treatments recommended for weed control in strawberries were evaluated. Weed control was excellent and serious crop injury was observed with only two out of six treatments.

INTRODUCTION: An experiment was designed to comparatively evaluate a number of treatments that had been developed at the Kentville Research Station, Kentville, Nova Scotia. These treatments were designed for use throughout Atlantic Canada but had not been tested in New Brunswick.

Whereas in the past, herbicide treatments for transplanted strawberries usually consisted of one treatment of a high rate (in excess of .9 kg/ha) of simazine in the fall, the new recommendations were for two and usually three sequential herbicide applications throughout the planting year. Treatments were primarily based upon very low rates of simazine and or terbacil. The concept was to maintain just enough herbicide in the soil to control germinating annual weeds at all times, by applying several low doses, which would be very safe to the crop.

MATERIALS AND METHODS: Strawberry variety Veestar was transplanted on May 16th and 20th, 1980, at the D'Aoust strawberry farm in Jemseg, N. B. Herbicides were applied with a precision plot sprayer. Spring treatments were applied on June 2nd. Late summer treatments were applied August 25th and late fall treatments on November 14th. Visual observations on weed control and crop tolerance were made on October 11th, 1980 and May 29th, 1981. Total yields were accumulated over a period of 19 days in June-July, 1981. All results are an average of four replications.

---

[1] Weed Specialist, New Brunswick Department of Agriculture and Rural Development.

[2] Fruit Crop Specialist, New Brunswick Department of Agriculture and Rural Development.

TABLE 1.

SEQUENTIAL HERBICIDE TREATMENTS FOR STRAWBERRIES

TREATMENTS Kg/Ha				STRAWBERRIES			% WEED CONTROL	REMAINING WEEDS
SP	LS	LF		S	V	Yield kg/ha		
0.25	0.125	0.50	Terbacil	29	19	13705	86	LQ, SS, VE
0.50	0.33	1.0	Simazine	29	20	12731	79	LQ, SS, VE, QG
4.45		4.45	napropamide	38	25	9124	81	LQ, SS, VE QG
0.50	0.50		Simazine	29	19	13349	79	SS, VE, QG
6.0			chloroxuron	26	20	12771	86	SS, VE
	0.50	1.0	Simazine					
0.50	0.50	0.50	simazine	33	18	10135	89	LQ, SS, DL VE, QG
0.125	0.125	0.125	terbacil					
			Weedy Check	29	15	13277	50	LQ, SS, VE QG
			Weedy Check	30	14	12548	61	LQ, SS, VE, QG, CL

SP- Spring LS- Late Summer, LF- Late Fall, LQ- Lambsquarters, SS-Sheepsorrel, VE-Vetch, QG- Quackgrass, DL- Dandelion, CL-Clover.

RESULTS AND DISCUSSION: Weed control was good with all the herbicide treatments tested. Slightly higher than average crop injury was observed with the napropamide treatment, and the combinations of simazine 0.50 kg/ha plus terbacil 0.125 kg/ha (see strawberry stand - Table 1). The higher injury rating appears to be reflected in the yield.

All the treatments were cultivated several times during the summer by grower field crews. This had a very detrimental effect on chemical weed control as the cultivation procedure destroyed the residual control. Weeds regrew very quickly in the path of the cultivator. The occurence of lambsquarters in several of the treatments is likely due to loss of control as a result of cultivation rather than ineffective treatments.

Quack grass (couch) also observed in many of the treatment plots should have been eradicated prior to planting by an appropriate cover crop rotation or by chemical means.

CONCLUSION: Several effective, safe herbicide treatments were demonstrated for strawberries. The napropamide and the series of simazine 0.50 plus terbacil 0.125 kg/ha, treatments may have caused excessive crop injury resulting in depressed yields.

The treatment of terbacil 0.25, 0.125 and 0.50 kg/ha early spring, late summer and late fall respectively, gave the highest yield and very good weed control.

Growers following sequential treatments such as those outlined in this report and in the strawberry weed control recommendations should avoid cultivation whenever possible provided weed control is being maintained.

DEMONSTRATION OF STRAWBERRY YIELD ENHANCEMENT BY SOIL FUMIGATION[1]

PROGRESS REPORT

BY

D. B. FINNAMORE, E. ESTABROOKS, B. DYKEMAN,
W. PERRY, G. REED[2]

Abstract: Fumigated and untreated soil plots were planted to strawberry plants in 1981. Soil nematode counts were made in late June and strawberry daughter plants were counted in September, 1981, on the plots.

INTRODUCTION: This project was undertaken to demonstrate to strawberry growers the benefits of strawberry soil fumigation in five major producing areas on commercial strawberry farms. (Finnamore, 1980). This was the second year for the project. In 1980, land was ploughed and soil fumigated in preparation for planting in 1981.

METHODS: Disease free strawberry plants of the variety Vee Star were obtained in the spring of 1981 from the New Brunswick Department of Agriculture and Rural Development Horticultural Nursery. The strawberry plants were transplanted by the grower co-operators into one-half acre fumigated soil plots and into adjacent one-half acre untreated soil plots, at each of the five sites. The plot located in the northeast was not planted until late July, due to wet soil conditions. The other four sites were planted in May and early June.

Soil samples were taken in late June to determine the soil nematode populations in both the fumigated and untreated soil. Soil nematode counts were done by Dr. J. Kimpinski, Agriculture Canada, Research Station, Charlottetown, P.E.I. Table I gives the soil nematode count, taken before fumigation in 1980, and in late June, 1981.

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Provincial Entomologist, Fruit Crop Specialist, Horticulturist, Nursery Manager, Technician, respectively, New Brunswick Department of Agriculture and Rural Development.

Counts were made of mother and daughter plants in September, 1981. Five counts were made, in both the fumigated and untreated plots at all locations, except in the northeast where transplanting was delayed. Table II gives the average number of daughter plants per mother plant in twenty row feet of strawberry plants.

TABLE I: ROOT LESION NEMATODE COUNTS FROM UNTREATED AND FUMIGATED SOIL 1980 AND 1981

	ROOT LESION NEMATODES*		
County	Untreated 1980	Fumigated 1981	Untreated 1981
Westmorland	0	0	0
Restigouche	0	0	0
Carleton	1,469	0	0
York	150	0	0
Queens	0	0	440

*Root counts based on nematodes per gram dry root. Soil counts based on nematodes per kilogram dry soil. Two plots had insignificant numbers of pin and spiral nematodes in 1980. None were found in the 1981 counts.

TABLE II: AVERAGE NUMBER OF DAUGHTER PLANTS PER MOTHER PLANT IN TWENTY FEET OF ROW IN FUMIGATED AND UNTREATED SOIL, SEPTEMBER, 1981.

	AVERAGE NUMBER OF DAUGHTER PLANTS/MOTHER PLANT	
County	Fumigated Soil	Untreated Soil
Westmorland	13.8	14.1
Carleton	5.6	4.94
York	6.3	5.97
Queens	19.96	15.24

Plant counts were not made on the plot in the northeast, due to the late transplanting of the strawberry plants.

DISCUSSION: Nematode counts, taken before fumigation in 1980, were very small in all plots except one. Summer fallowing of the plots in 1980 would tend to reduce nematode populations. In all, except for one plot, no root lesion nematodes were found in June, 1981.

The average number of daughter plants per mother plant in twenty row feet, as shown in Table II, shows very little difference between fumigated and untreated plots. However, when plant counts were made, plants growing in fumigated soil were larger and generally more robust than plants growing in the untreated soil.

In 1982, fruit yield will be obtained from the plots.

REFERENCES: Finnamore, D. B., et al. 1980, Demonstration of Strawberry Yield Enhancement by Soil Fumigation, p. 55-56. *In* New Brunswick Department of Agriculture and Rural Development. Plant Industry Branch. Adaptive research reports 1980.

EVALUATION OF SOIL FUMIGANTS ON STRAWBERRY SOILS

B. W. DYKEMAN AND W. PERRY[1]

Abstract: Three soil fumigants were evaluated at various rates on soils used for strawberry plant production. Response to all fumigants was poor in 1981 compared to previous years. Telone C17 fumigant plots yielded the largest number of daughter plants, 35% over non-fumigated plots.

INTRODUCTION: The use of soil fumigation for the control of nematodes, soil fungi and in some cases weeds in strawberry soils is a wide spread practice across much of North America. The response to soil fumigation varies with location, soil type, crop rotation and management practices, application methods and timing, and with weather conditions in addition to soil pathogen levels.

The use of soil fumigants on the light soils of the New Brunswick Horticulture Centre is considered essential for the production of healthy planting stock. The use of fumigants have consistently yielded daughter plant increases in the area of 30% to 50% over non-fumigated soils (Dykeman, 1977).

Soil fumigation is an expensive practice yet the economic benefits to producers can be substantial under certain soil and soil pathogen situations. Where soil nematode counts are high or where black root rot or verticillium wilt are a problem, soil fumigation should be evaluated by producers. With soil fumigants, the method and timing of application are extremely important. The entire benefits of fumigation can be lost if extreme care is not taken in their application.

METHODS: In 1981, the various fumigants available on the market were screened at the N. B. Horticulture Centre for their effectiveness in increasing daughter plant production.

Three fumigants were tested: Telone II (Dow), a nematocide; Telone C17 (Dow), a soil sterilant; and Vorlex (Pfizer), a soil sterilant. Telone C17 and Vorlex were tested at a nematode and black root rot control rate (168 l/ha) and at a soil sterilant rate (450 l/ha).

---

[1] Horticulturist and Farm Manager, New Brunswick Department of Agriculture and Rural Development.

TABLE I. EFFECT OF SOIL FUMIGANT ON THE PRODUCTION OF DAUGHTER PLANTS AT THE N. B. HORTICULTURE CENTRE IN 1981.

FUMIGANT	RATE L/ha	DAUGHTER PLANTS/3M			MEAN
		VEESTAR	REDCOAT	MICMAC	
Control	0	96	116	109	107
Telone II	168	90	98	165	118
Telone C17	168	133	134	145	137
Telone C17	450	123	110	144	126
Vorlex	168	100	71	132	101
Vorlex	450	99	91	117	102

To screen this material, 0.4 hectare blocks of each fumigant were established (45 m x 90 m) in early September, 1980. In late spring of 1981, foundation plants of three strawberry cultivars were planted across these plots. In September, three 3 cm sections within each cultivar in each fumigant plot were counted to determine the number of daughter plants.

RESULTS AND DISCUSSION: The response to soil fumigants in 1981 in daughter plant yield appeared to be lower than in previous years (Table I). Plant growth in 1981 in general, yielded large daughter crowns but relatively few in number. Unfortunately, the size of crown or the number of multiple crowns produced were not evaluated across the fumigant treatments.

Telone C17 treated soil produced 35% more rooted daughter plants than unfumigated soil. There was no advantage in 1981 in using the sterilant rates of either Telone C17 or Vorlex.

The poor response to Vorlex in 1981 can not be explained. This fumigant has given excellent results in previous years.

SUMMARY: Three soil fumigants were screened in 1981 for their effectiveness in promoting strawberry daughter plant production. Results in 1981 showed that Telone C17 at the low rate of 168 l/ha (15 g/ac) produced the greatest number of rooted daughter plants. There was no advantage observed in using the sterilant rates. The screening was carried out on large (.4 ha) area plots without replication.

REFERENCES: Dykeman, B. W. 1977. Soil Fumigation of Strawberry Fields. Research Report, 1977. New Brunswick Department of Agriculture and Rural Development.

WINTER MULCHING OF STRAWBERRIES

B. W. DYKEMAN AND W. PERRY[1]

Abstract: Overwinter mulching studies have been carried out for a number of years at the N. B. Horticulture Centre, Hoyt. In 1981, significant differences in the survival of fruit buds and subsequently yield were recorded between various treatments. Long-term results are discussed in this report.

INTRODUCTION: New Brunswick is on the northern fringe of commercial strawberry production. Extensive winter injury on strawberries has been common three years out of five in this province in recent years. Some injury does occur almost every year in one part of the province or the other. Yet, growers have mixed opinions on the value of winter mulches; in particular, the traditional straw mulch.

The N. B. Horticulture Centre, Hoyt, is located in an area which has a high incidence of winter injury due to low winter temperatures and the lack of dependable snow cover. Also, its fields are very flat so that icing is common following January or February rains. Finding improved methods of field wintering plants at the Centre was the original purpose for initiating these studies, but the objectives have since been expanded to include developing better overwintering methods for commercial fields.

The study has been carried out for four years with various treatments and with very different results depending on winter conditions. The results and implications of this work will be discussed herein.

METHODS AND MATERIALS: Each year, this study is carried out in a randomized complete block design, with 4-6 replications, using the cultivar "Redcoat". In 1980-81, four replications were used using 6 m plots. Mulches were applied at the time of freeze up, around November 15, 1980. The treatments tested in 1980-81 were as follows:

---

[1] Horticulturist and Nursery Manager respectively, New Brunswick Department of Agriculture and Rural Development.

1. Control - no mulch.
2. Straw, 4T/ha (2 ton/acre or 100 bales/acre).
3. Straw, 8T/ha (4 ton/acre or 200 bales/acre).
4. Sawdust, 2.5 cm (100 yd^3/acre).
5. Sawdust, 5.0 cm (200 yd^3/acre).
6. White Polyethylene.
7. Straw, 8T/ha under white polyethylene.
8. White polyethylene under straw, 8T/ha.

Soil and crown temperatures were recorded at intervals throughout the winter under each mulch. Plant counts were taken in early June and plots were harvested from June 29 to July 9.

RESULTS AND DISCUSSION: The 1980-81 winter can be described as having adequate snow cover until February. The second week of February brought with it one of the warmest spells on record for that time of year. Night temperatures were above freezing for seven days and day time temperatures exceeded 13°C. Plant crown temperatures reached 10°C in this period and soil temperatures at 2 cm depth reached 5°C. New leaf growth was actually observed on the no mulch treatment during this period.

It was fortunate that this period was not followed by extremely low temperatures. Consequently, very few, if any, plants were lost at this time. However, it does appear that fruit buds were injured. This condition was followed by low temperatures in May which did further damage to early developing fruit buds.

From Table I, it can be seen that there were no differences in surviving plant counts across all mulch treatments. However, considerable differences in yields were recorded. The better mulch treatments yielded three times the control plots. The heavy application of straw, the high rate of sawdust and the straw over white polyethylene produced the best yields. These three treatments gave the least fluctuation in crown and soil temperatures in February and delayed development in the spring.

The four years in which these studies have been carried out have had four distinctly different winter conditions. These can be described as follows:

TABLE I. Effect of Various Winter Mulching Systems on the Yield of Strawberries c.v. Redcoat. 1981.

Mulch	Plot Yield (kg)	Yield (kg/ha)	# Live Plants/m
White polyethylene	1.76	1959 *a**	48.6 *a*
No mulch	2.13	2364 *a*	51.4 *a*
Sawdust, 2.5 cm (100 yd^3/ac)	3.74	4154 *ab*	53.2 *a*
Straw, 2 T/ha	4.10	4557 *ab*	55.7 *a*
Straw under white polyethylene	4.99	5539 *bc*	53.2 *a*
Straw, 4 T/ha	6.33	7031 *bc*	57.9 *a*
Sawdust, 5 cm	6.96	7733 *c*	50.0 *a*
Straw over white polyethylene	7.49	8328 *c*	55.6 *a*

*means followed by like letters are not significantly different at the .05 level of the NDMR test.

TABLE II. Effects of Various Mulches on the Overwintering of Strawberries c.v. Redcoat

Mulch	1976-77 % Winterkill	1978-79 % Winterkill	1979-80 % Winter-kill	1980-81 % Crop Loss (as % of best trmt)
No mulch	58 *a*	100	0 *a**	78 *a*
Straw, 4 T/ha	54.8 *a*	100	12 *a*	45 *ab*
Straw, 8 T/ha	18.5 *a*	100	3 *a*	16 *bc*
Sawdust, 2.5 cm	15.3 *b*	100	12 *a*	50 *ab*
Sawdust, 5.0 cm	14.3 *b*	100	25 *a*	7 *c*
White poly.	31.5 *b*	100	9 *a*	76 *a*
Straw under white poly.	-	-	14 *a*	33 *bc*
White poly. under straw	-	-	2 *a*	0 *c*

*means followed by like letters are not significantly different at the .05 level of the NDMR test.

Year I (1976-77) - A winter with good snow cover, but extreme low temperatures in December prior to snowfall. Unmulched plants suffered 86% winter kill and the best mulch treatments (sawdust) only 14% winter kill.

Year II (1978-79) - A winter with record low soil temperatures for a two week period in February below the critical temperature for strawberry roots. Winter kill was near 100% across all treatments.

Year III (1979-80) - A very moderate winter with good snow cover. Virtually 100% plant survival across all treatments. The yields were not recorded.

Year IV (1980-81) - As described earlier, extremely high temperatures in February and low May temperatures resulted in no plant losses but damage to fruit buds. A good yield response to mulches resulted.

SUMMARY: From this work to date, the following points can be drawn:

1. From this year's data, it is evident that plant counts alone are not adequate in evaluating mulch treatments, i.e., that plant stand in the spring is not necessarily indicative of yield potential.

2. In the four years of testing, two years produced a strong response to mulching. Had yield data been taken in Year III, a response may have been evident in that year also.

3. In no situation has a superior mulch been found to straw at the rate of 8 tonne/hectare or 4 ton/acre (200 bales/acre). Straw applied at half this rate (100 bales/acre) which is a common practice in New Brunswick has repeatedly proven inadequate and should be considered a false economy.

4. There is no such thing as an average or standard winter in New Brunswick. Growers must plan on severe winter conditions and protect their crop accordingly.

It is evident that a number of years of testing are required to draw any conclusive results. Testing will continue and will include harvest data.

PRELIMINARY REPORT
ON
RED RASPBERRY CULTIVAR TRIAL

BY

E. N. ESTABROOKS[1]

Abstract: A red raspberry cultivar trial composed of five cultivars was established at Hoyt, N.B. during 1980. A few notes about growth habit were made during 1981.

INTRODUCTION: In recent years there has been a renewed interest in red raspberries for U-Pick in New Brunswick. Due to lack of local information, recommendations for cultivars has been based on test results from Nova Scotia and Prince Edward Island.

PROCEDURE: A trial composed of the five cultivars most commonly being planted in N.B. was established at the Horticulture Centre at Hoyt on sandy soil. Eight crowns per plot in three replications were planted at a spacing of 91 cm in the row with 182 cm between rows.

RESULTS: Preliminary results indicate that Festival, Madawaska and Matsqui were the easiest to establish while Carnival and the Kentville selection (K65-12) was the most difficult. Observation of growth made during 1981 indicate that the Madawaska and Matsqui cultivars produced the most numerous suckers. New growth on the Carnival cultivar was very short while that of Festival was longest of any of the cultivars being grown in the trial.

---

[1] Fruit Crops Specialist, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development

DISCUSSION: Although Festival, Madawaska, and Matsqui appear to be the easiest to establish, yields in future years may not follow the same pattern as the vegetative growth to date.

CONCLUSIONS: It is too early to draw any conclusions from the preliminary results during this period of plant establishment. Yield data will be collected starting in 1982.

REGIONAL BEDDING PLANT TRIALS

BY

A. CURRIE[1], S. WENTZELL

Abstract: Bedding plant trials were carried out at the Horticultural Center in Hoyt, to evaluate varieties of seed Geranium Salvia, Snapdragon, Petunia, Marigolds and Impatiens. Data recorded included: spread, height, bloom size, and ratings of performance.

INTRODUCTION: Bedding plant trials were carried out again in 1981 at the Horticultural Center at Hoyt as a joint project between the New Brunswick Department of Agriculture and Rural Development and the Nova Scotia and Prince Edward Island Departments of Agriculture. These trials are carried out in the three Maritime Provinces as a cooperative effort for the region at Hoyt, Kentville, Charlottetown and Truro.

RESULTS: Readings from bedding plant trials include spread, height and bloom size all in centimeters, as well as a rating out of 60 or out of 40 for some mixtures, to evaluate bloom trueness to type and plant adaptation and resistance.

Varieties are listed in order of performance ratings. Readings were recorded twice: July 22 which should indicate optimum growth, and September 28, which should indicate longevity and plant quality late in the growing season.

---

[1] Greenhouse Specialist and former Horticulture Technician, New Brunswick Department of Agriculture and Rural Development.

TABLE I

A. Impatiens July 22

Variety	Plant Height	Plant Spread	Bloom Size	Performance 1-60
Gem Mix	10	16	4.5	37
Ripple Mix	16	25	3.9	37
Grande Mix	12	17	4.5	36
Zig Zag Mix	20	23	4.0	35
Furtura Mix	15	24	4.0	35
Super Elfin Mix	16	20	4.0	34
Minette Mix	12	23	4.0	34
Twinkle Mix	10	22	3.7	33
Fantasia Mix	10	23	3.9	32

B. Marigolds July 22

Variety	Plant Height	Plant Spread	Bloom Size	Performance 1-60
First Lady	43	32	8.0	53
Moonshot	33	28	7.5	50
Orange Winner	21	23	5.6	50
Glowing Embers	30	25	5.5	49
Burgundy Ripple	32	23	4.5	49
Red Sevenstar	36	25	6.0	49
Diamond Jublilee	67	26	9.6	49
Legal Gold	30	33	6.5	48
Yellow Gold	17	20	4.5	48
Dainty Merietts	28	21	4.5	48
Apollo	36	30	8.5	48
Gold Galore	42	22	10.5	48
Gingersnap	19	23	4.5	48
Lemon Drop	19	20	3.0	47
Gold Finch	32	28	4.9	47
Midas Touch	27	27	5.0	47
Gold Strike	26	19	4.0	47
Honeycomb	26	19	4.0	47
Cinnabar	30	24	5.0	47
Rusty Red-Fanddngo	36	30	5.7	47
Nel Gwyn	40	30	5.5	46
Happy Face	56	34	10	45
Spinwheel	36	28	6.0	45
Sunrise	30	30	4.0	43
Petite Mix	24	23	4.0	42
Stardust	30	16	5.0	41
Panther	24	24	4.5	40
Boy O Boy Mix	21	20	4.0	33

C. Salvia July 22

Variety	Plant Height	Plant Spread	Bloom Size	Performance 1-60
St. Johns Fire	30	16	8.0	46
White Fire	21	14	6.0	45
Carabiniere Red	28	18	7.5	45
Carabiniere Orange	29	23	6.8	45
Flashing Light	23	23	8.5	45
Red Hassar	24	20	6.0	45
Scarlet Pygmy	34	14	7.0	44
Carabiniere Blue	27	27	6.5	44
Blaze of Fire	33	17	7.0	44
Early Bonfire	50	16	7.0	43
Dwarf Caramba	26	16	6.7	43
Carabiniere White	24	17	6.5	43
Splendens	35	18	6.3	42
Fireball	25	14	7.0	42
America	47	10	6.8	41
Bonfire	43	19	6.5	40

D. Snapdragons July 22

Variety	Plant Height	Plant Spread	Bloom Size	Performance 1-40
Kim Mix	23	28	8.0	36
Pixie Mix	27	29	8.0	33
Sweetheart Mix	29	14	7.0	31
Sprite Mix	26	16	7.0	31
Floral Carpet Mix	14	13	7.0	31
Dwarf Kolibri Mix	12	18	5.5	31
Coronette Mix	24	22	7.5	27

E. Geranium July 22

Variety	Plant Height	Plant Spread	Bloom Size	Performance 1-60
Snowdon	27	26	12.0	47
Heidi	33	22	10.0	46
Salmon Flash	29	24	9.5	46
Encounter Red	28	29	10.5	46
Dynamite	20	23	8.5	44
Cameo	25	17	9.5	43
Cherry Glow	32	28	13	43
Sooner Red	31	28	11	43
Bright Eyes	32	23	12.0	42
Ringo Scarlett	28	15	11.0	41
Orbit Scarlet	30	23	10.0	41
Ringo Rose	26	32	12.0	41
Playboy Cherry Red	20	21	11.5	41
Playboy Rose	24	19	11.0	41
Playboy Scarlet	25	25	10.5	41
Playboy Salmon	20	21	9.5	40
Fireflash	30	27	11.0	40
Showgirl	25	28	13.0	40
Rosita	30	24	10.0	40
Picasso	27	27	13.5	39
Sooner Salmon	32	23	10.0	39
Knockout	28	24	9.0	39
Firecracker	34	23	10.0	39
Capri Deep Red	30	21	10.5	39
Capri Deed Brick Red	33	30	10.0	39
Capri White	27	20	9.5	39
Razzmatazz	31	22	10.8	38
Deep Rose Flash	38	23	10.0	36
Mustang	30	24	10.0	36
Orbit Red	30	22	11.0	36
Cherio	30	20	9.5	36
Jackpot	30	19	12.5	35
Ice Queen	25	25	8.5	33

TABLE II

A. Impatiens September 28

Variety	Plant Height	Plant Spread	Bloom Size	Performance 1-60
Futura Mix	7	33	3	24
Super Elfin Mix	7	23	3	23
Twinkle Mix	8	28	3	20
Ripple Mix	5	39	3	20
Zig Zag Mix	18	39	3	20
Grande Mix	8	32	3	20
Gem Mix	5	36	3	20
Minette Mix	9	36	3	20
Fantasia Mix	5	28	3	17

B. Marigold September 28

Variety	Plant Height	Plant Spread	Bloom Size	Performance 1-60
Janie	13	26	5	48
Panther	38	32	5	46
Red Sevenstar	38	35	4	44
Nel Gwyn	50	35	7	44
Ginger Snap	24	32	4	43
Legal Gold	30	40	6	43
Gold Galore	52	32	6	43
Cinnabar	35	32	6	42
Glowing Embers	30	33	4	42
Gold Finch	40	40	5	40
First Lady	53	44	7	38
Stardust	28	19	5	38
Apollo	36	27	7	38
Lemon Drop	22	39	5	38
Burgundy Ripple	40	50	4	38
Orange Winner	26	28	5	38
Diamond Jubilee	34	28	7	37
Gold Strike	29	34	4	37
Moonshot	54	45	7	36
Midas Touch	35	43	5	36
Dainty Merietts	30	40	3	36
Petite Mix	26	39	4	35
Sunrise	28	30	5	34
Yellow Gold	20	23	5	34
Rusty Red Fandango	43	30	6	34
Boy-O-Boy Mix	20	30	3	32
Happy Face	54	40	6	32
Spinwheel	43	45	6	31
Honeycomb	23	29	5	29

C. Salvia — September 28

Variety	Plant Height	Plant Spread	Bloom Size	Performance 1-60
St. Johns Fire	22	19	10	42
Red Hassar	24	21	9	42
Blaze of Fire	21	20	5	42
Dwarf Caramba	20	20	9	42
Carbiniere White	20	20	9	42
Flashing Light	18	15	3	41
Scarlet Pygmy	27	17	5	41
Carabiniere Red	27	20	4	41
Carabiniere Orange	24	24	4	41
America	40	29	7	41
Bon Fire	30	22	6	40
White Fire	20	19	5	40
Early Bonfire	32	25	5	32
Fireball	20	26	4	32
Carabiniere Blue	33	26	4	31
Splendens	22	17	-	31

D. Snapdragons — September 28

Variety	Plant Height	Plant Spread	Bloom Size	Performance 1-60
Sweetheart Mix	27	29	7	43
Sprite Mix	38	29	6	43
Pixie Mix	20	29	7	43
Coronette Mix	34	20	5	42
Floral Carpet Mix	13	20	6	42
Pixie Mix	20	29	3	41
Kim Mix	13	20	3	40
Dwarf Kalibri Mix	18	29	-	34

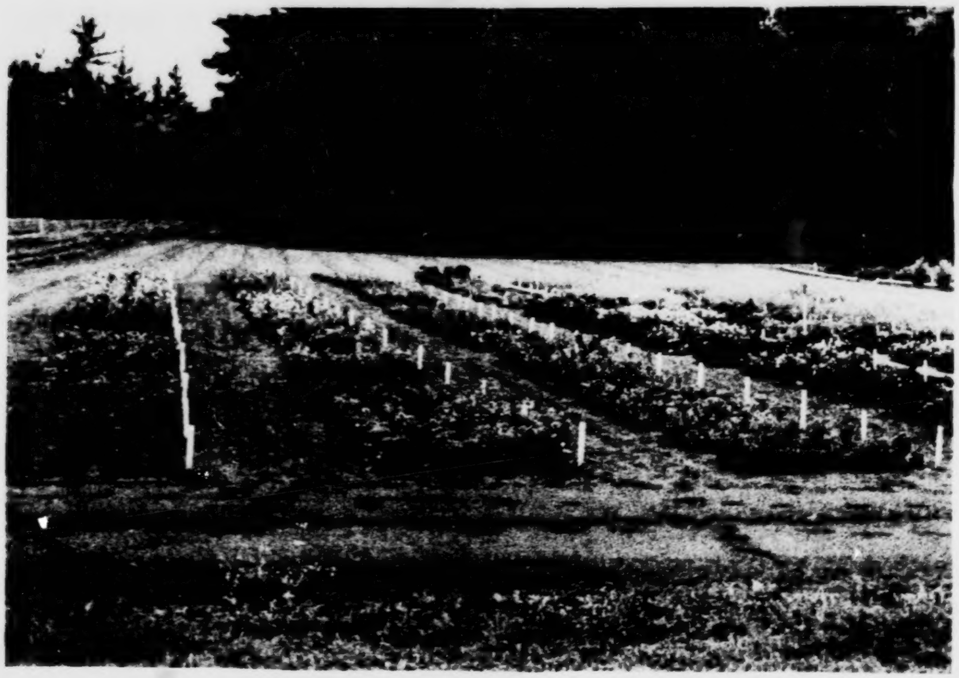
E. Geranium — September 28

Variety	Plant Height	Plant Spread	Bloom Size	Performance 1-60
Ringo Rose	25	29	8	46
Sooner Red	29	32	8	46
Jack Pot	33	30	8	46
Rosita	34	30	7	46
Encounter Red	39	40	6	46
Salmon Flash	36	33	7	46
Heidi	37	40	7	46
Ice Queen	30	30	7	46
Deep Rose Flash	36	30	8	46

F. Petunia September 28

Variety	Plant Height	Plant Spread	Bloom Size	Performance 1-60
Star Joy	38	49	7	42
Mercury	54	67	6	41
Comanche Improved	30	70	6	41
Purple Plum	50	60	6	41
Sugar Blues	30	60	7	40
Scarlet Satin	32	63	-	38
Summer Sun	40	60	-	38
Cherokee	40	80	-	38
Orange Bells	40	70	-	35
Red Devil	36	70	-	35
Comet	40	65	-	35
Comanche W	50	50	-	35
Pale Face	30	60	-	35
Sugar Plum	40	58	5	34
Red Joy	30	50	6	33
Starlight Joy	34	48	-	31
Moonglow	45	63	-	30
Plum Pink	34	60	6	29

Figure 1. 1981 Regional Bedding Plant Trial Grounds - Hoyt, N.B.



POINSETTIA SOILLESS MEDIA TRIAL

BY

A. W. CURRIE[1]

Abstract: Three varieties of poinsettia were evaluated on their response to two types of unsterilized soilless media. There appeared to be no difference between plants in the two media types. The white sport was more susceptible to disease than the red or pink sports.

INTRODUCTION: Reduction in growing costs to poinsettia producers wherever possible increases the dollar return on investment. Soilless media is usually considered to be more free from disease than a media containing soil.

The standard mix for soilless media usually includes peat, vermiculite and perlite on a 1:1:1 ratio. The second media utilized sawdust in place of perlite. This might be utilized by a grower in an attempt to reduce the overall potting costs.

METHODS: Rooted cuttings were potted in the various mixes on August 27th. Each mix had 17 lbs. of Dolomitic limestone, 2 tbsp. of Chelated trace elements, and 2 lbs. of Mag-Amp slow released fertilizer added per cubic yard of mix.

Following that, a continuous feeding program of 20-20-20 at 300 ppm N was initiated.

On September 15th pinching occurred. September 23rd temperature regime was lowered to initiate bud formation. October 5th Cycocel drench was applied. October 9th and November 1st, drenches of Truban and Quintozene were applied.

RESULTS AND DISCUSSION: The final marketable products resulting from each soilless media were identical in quality. Disease problems were found in both media types. Moisture retention appeared to be better in the sawdust mixture.

---

[1] Greenhouse Specialist, New Brunswick Department of Agriculture and Rural Development.

The white poinsettia sport was attacked more frequently by disease than the other sports. Mortality for white was 40%, pink 20%, followed by red sport 10%.

CONCLUSIONS: Since growth, plant quality and disease problems were uniform in both media types; the culture problems most likely resulted in the fact that an unsterilized media was used. The data suggests that the white and pink sports are more susceptible to failure under unfavourable growing conditions. However, this can only be confirmed by a continued study into sterilized and unsterilized media trials.

ORNAMENTAL EVALUATION PROGRAM
(1976-1981)

BY

B. W. DYKEMAN[1]

Abstract: Over 140 species and/or cultivars of ornamental shrubs were evaluated at the New Brunswick Horticulture Centre from 1976 to 1981 to determine hardiness and suitability for use and for production in New Brunswick. The final recommendations based on this study are reported in this study.

Figure 1. Ornamental Evaluation Grounds at the New Brunswick Horticultural Centre, Hoyt.

INTRODUCTION: Over the past five years, a range of evergreen and deciduous shrubs have been evaluated for their usefulness in New Brunswick. Of prime concern was the hardiness of this material. The following lists provide the results of this evaluation. It should be noted that the species and varieties tested are but a small percentage of those which should be evaluated in New Brunswick. Therefore, the recommendations given below refer only to these varieties and do not imply a preference over untested (unlisted) varieties.

---

[1] Horticulturist, New Brunswick Department of Agriculture and Rural Development.

It should also be noted that this evaluation was carried out at the New Brunswick Horticulture Centre in Hoyt, New Brunswick, a site which is quite severe. The Centre has a microclimate which would place it in a 4b Canadian plant hardiness zone. Therefore, the hardiness rating given to shrubs in this report is quite conservative and should safely serve much of the Province.

This report is designed to give direction to commercial nurserymen and landscape contractors in New Brunswick rather than the general public. Many species listed as only semi-hardy in this guide would perform well in a protected home landscape or in areas with dependable snowcover. However, these species/varieties are not recommended for commercial field production in New Brunswick or for use on exposed commercial or public sites.

Regarding growth rates, most hardy deciduous species and varieties were saleable in one to two years from a rooted cutting. Most evergreens were saleable in four to five years from rooted cuttings or from one-year seedlings, under the production system in use. All plants were field grown in a light sandy loam soil. Plants were fertilized once a year with 50 kg/ha of nitrogen using 17-17-17 fertilizer. Plants were irrigated as required during first two years of growth.

GUIDE TO SUMMARY:

Hardiness Guide:

A - fully hardy
B - only occasional dieback, up to 50%
C - frequent and extensive dieback, or roots not dependably hardy
D - would not survive test site.

Horticultural Value:

This rating is primarily for horticultural or landscape value regardless of hardiness.

ORNAMENTAL EVALUATION PROGRAM

SUMMARY STAGE I - (1976-1980)

NAME	HARDINESS	USEFULNESS	RECOMMENDED USE			COMMENTS
			RESIDENTIAL	COMMERCIAL	NURSERY PRODUCTION	
EVERGREENS						
Juniperus scopulorum "Moonglow"	B	Excellent	X	X	X	
J. scopulorum "Witchita Blue"	A	good	X	X	trial	Very slow growing upright
J. chinensis Mountbatten	B	fair	X	0	X	
J. communis "Suecica Major", Swedish	A	good	XX	X	XX	broad upright
J. chin. pftzeriana	C	poor	0	0	0	"Blue Danube" is a superior cultivar
J. chin. pfit. "Mint Julip"	C	poor	0	0	0	best upright spreader, green vigorous
J. chin. pfit. "Sea Green"	A	excellent	XX	XX	XX	
J. chin. pfit. "Monrovia"	C	poor	0	0	0	
J. chin. pfit. "Gold Coast"	C	fair	X	0	0	requires protected location superior to "Gold Coast"
J. chin. pfit. "Aurea" Golden Pfitizer	C	good	X	0	0	
J. chin. pfit. "Ozark"	C	poor	0	0	0	
J. horizontalis "Waukegan"	A	excellent	XX	X	XX	Best of blue ground covers, 12 cm high.
J. hor. plumosa, Andorra	B	good	X	X	X	
J. hor. plumosa compacta, Compact Andorra	B	good	X	X	X	
J. hor. "Wiltonii , Blue Rug	A	good	X	X	X	Not as dense as Waukegan, 7 cm high.
J. hor. "Prince of Wales"	A	excellent	XX	XX	XX	Dense green foliage ground cover 7 cm.
J. hor. glauca	A	good	X	X	0	Similar to "Blue rug"
J. hor. "Emerson"	A	good	X	X	X	Similar to Blue Rug & glauca
J. sabina, Savin Juniper	A	good	XX	X	X	
J. sabina "Hicksii"	A	good	XX	X	X	Slow growing upright spreader
J. sabina "Scandia"	A	good	X	X	X	vigorous ground cover 15 cm high
J. sab. tamariscifolia, Tamarix	B	fair	X	0	marginal	
J. sab. "Buffalo"	C	poor	0	0	0	Considerable dieback
J. sab. "Von Ehron"	B	fair	X	XX	0	Vigorous spreader
J. sab. "Blue Danube"	A	excellent	XX	X	X	Semi vigorous upright spreader
J. glauca Hetzi	A	good	limited	XX	XX	
J. virginiana "Skyrocket"	A	fair	limited	X	X	

NAME	HARDINESS	USEFULNESS	RESIDENTIAL	COMMERCIAL	NURSERY PRODUCTION	COMMENTS
J. virginiana "Blue Mountain	C	fair	0	0	0	
Pinus nigra Austrian Pine	A	good	X	X	X	
Pinus sylvestris, Scot's Pine	A	fair	limited	limited	X	Difficult to retain form and central leader
Pinus mughus, Mugho pine	A	good	X	X	X	
Pseudotsuga taxifolia, Douglas Fir	B	fair	0	X	0	
Taxus media "Brownii"	C	fair	X	0	0	
T. media "Hicksii"	C	fair	X	0	0	
T. media "Hillii"	C	fair	X	0	0	
T. media "Thayeri"	C	fair	X	0	0	
T. media "Wardi"	C	fair	X	0	0	
T. cuspidata, Japanese Yew	C	fair	X	limited	0	
Thuja occidentalis "Fastigiata" Pyramid Cedar	B	good	X	X	x	fastest growth, tight, excellent
T. Occ. "Woodwardi Aurea" Golden Globe	A	good	X	X	x	smaller than woodwardi
T. occ. "Woodwardi"	A	good	X	X	x	
T. occ. "Little Champion"	A	excellent	XX	X	xx	More vigorous, larger than woodwardi
T. occ. "Emerald" (Smaragd)	B	excellent	XX	X	xx	Densest, bright green, slow growth
T. occ. "Brandon"	B	good	X	X	xx	good, dark green, dense, rapid growth
T. occ. "Techney"	B	poor	0	X	0	very loose & broad
T. occ "Holmstrup:	A	good	X	X	x	slow growing, thick, dark green
T. occ. "Hetz Wintergreen"	A	fair	X	0	0	narrow, similar to fastigiata but much slower growing.
T. occ. "Nigra"	A	poor	0	X	x	Loose, vigorous, dull dark green.
T. occ. Elegantissima "Gold tipped	C	good	X	X	0	
Tsuga canadensis, Canadian Hemlock	A	good	limited	XX	x	
Broadleaf Evergreens						
Euonymus fortunei vegetus	C	poor	0	0	0	
E. fortunei Emerald & Gold	C	good	0	0	0	

NAME	HARDINESS	USEFULNESS	RESIDENTIAL	COMMERCIAL	NURSERY PRODUCTION	COMMENTS
E. fort. Emerald Gaiety	B	good	X	0	trial	Use in protected location
E. fort. Gold Tip	C	good	0	0	0	
E. fort. Sarcoxie	C	good	X	0	trial (containers)	
E. kewensis	C		0	0	0	
Cotoneaster dammeri	C	excellent		X	trial (containers)	Roots are very cold sensitive, hardy with adequate snow cover.
C. dammeri "Coral Beauty"	D	good	0	0	0	to be retested
C. dammeri "Skogholm"	D	fair	0	0	0	to be retested
Pyracantha coccinea "Lowboy"	C	fair	trial	0	0	Requires protected location, treat as a ground cover.
P. cocc. "Kasan"	C	fair	trial	0	trial (containers)	Same as above
P. cocc. "Lalandii"	D	poor	0	0	0	
Daphne X burwoodii	C	fair	trial	0	0	
Deciduous Shrubs						
Chaenomeles japonica, Japanese Quince	D	good	0	0	0	Useful in milder areas of province
C. speciosa "Fire Dance"	D	good	0	0	0	
Cornus alba "Argento-marginata" (Elegantissima) silver Variegated Dogwood	A	good	X	X	X	
C. alba "Gouchaultii", Gold variegated	A	good	X	X	X	
C. alba "Sibirica", Redtwig	A	fair	0	X	X	
C. serica "Flaviramea", Yellow twig	A	poor	0	X	0	
Cotoneaster acutifolia, Peking cotoneaster	A	good	X	X	X	Useful for hedging
C. apiculatus	C	fair	trial	0	trial	treat as a ground cover
C. horizontalis, Rockspray	D	poor	0	0	0	
C. praecox	D	poor	0	0	0	
C. praecox Boer	D	poor	0	0	0	
Cotinus coggygria "Ribrifolius", Purple Smoketree	C	good	X	0	0	Milder areas of province.
Deutzia gracilis	B	poor	0	0	0	
D. lemoinei	B	fair	trial	0	0	

NAME	HARDINESS	USEFULNESS	RESIDENTIAL	COMMERCIAL	NURSERY PRODUCTION	COMMENTS
Euonymus alatus, Burning Bush	A	good	X	X	X	
E. alatus "Compactus"	A	excellent	X	X	X	
E. europaeus, Spindletree	B	fair	X	X	0	
Forsythia X intermedia "Lynwood Gold"	B	poor	0	0	0	
F. Karl Sax	B	poor	0	0	0	
F. ovata "Ottawa"	A	good	X	0	X	Flower buds hardy only in mildest areas of N.B.
F. ovata "Tetragold"	A	good	X	0	X	Same as above
Hydrangea aborescens, Snowhill	B	good	X	X	0	
H. aborescens, Annabelle	A	good	X	X	X	Better than Snowhill
H. paniculata "Grandiflora, Peegee	B	fair	limited	X	X	
Hypericum Kalmianum, Kalm St.Johns Wort	A	good	X	X	X	
Kolkwitzia amabilis, Beautybush	B	good	limited	X	trial	
Ligustrum amurense, Amur privet	C	fair	0	0	0	
L. vulgare, Common privet	B	fair	0	0	0	
L. vulgare, "Cheyenne"	B	fair	X	limited	trial	Hedging only
L. vicaryi, Golden privet	B	fair	trial	0	0	
Lonicera korolkowii "Zabellii"	A	good	X	X	X	
L. tatarica rosea	A	good	X	X	X	
L. xylosteum "Claveyi", Clavey's Dwarf	A	excellent	X	X	X	
L. japonica "Halliana"	C	good	trial	0	0	Hardy only as a ground cover, "Dropmore" should be hardier.
L. japonica "Hectrotti"	C	good	trial	0	0	Same as above
Philadelphus coronarius aureus, Golden Mockorange	B	good	X	X	x	
P. virginalis, virginal mockorange	A	limited	0	X	x	
P. virginalis "Minnesota Snowflake"	B	good	X	0	trial	Least hardy of mockoranges
Physocarpus opulifolius "luteus", Golden Ninebark	A	limited	limited	X	X	
P. opulifolius "Darts gold"	A	good	X	X	X	More compact than lateus
Potentilla frutiscosa "Coronation Triumph"	A	good	X	X	X	Tall, vigorous
P. fruticosa "Goldfinger"	A	good	X	X	X	very vigorous

NAME	HARDINESS	USEFULNESS	RESIDENTIAL	COMMERCIAL	NURSERY PRODUCTION	COMMENTS
P. fruticosa "Jackmanni"	A	good	X	X	X	Similar to Goldfinger
P. fruticosa "Klondike	B	good	XX	X	X	Dwarf
P. fruticosa tangerine	A	good	X	X	X	Orange bloom, broad mound
P. parvifolia farreri, "Gold Drop"	B	good	XX	X	X	Persistent blooming, tight mound
Prunus cistena "Purpleleaf Sand Cherry"	A	good	limited	X	X	Some dieback common
P. glandulosa "rosaplena", Dwarf Flowering Almond	B	good	trial	0	0	Considerable dieback
P. triloba "Multiplex", flowering Almond	D	-	0	0	0	to be retested.
R. alpinum, Alpine Currant	A	good	X	X	X	Hedging, male plants only
Ribes aureum, Golden currant	A	good	X	X	X	
R. nitidia Defender "Bristly Hedge Rose"	A	good	limited	X	X	Dwarf hedge
R. repens rosa	A	poor	0	0	0	trailing ground covers
R. repens alba	A	poor	0	0	0	" "
Rosa rugosa "Hansa"	A	good	X	X	X	
Sambucus canadensis "Aurea",Golden Elder	A	good	X	XX	x	
Spirea bumalda "Anthony Waterer"	A	good	X	X	X	
S. bumalda "Goldflame"	A	good	X	X	X	
S. japonica alpina (S. albiflora)	B	good	X	limited	X	Dwarf, compact, white flower
S. snow mound	A	good	X	X	X	fine foliage, compact
S. X vanhouttei	A	good	X	X	X	
Symphoricarpus albus, Snowberry	A	good	X	X	X	
S. chenaultii "erecta"	C	-	0	0	0	
Syringa chinensis "Saugeana",Chinese lilac	A	good	X	X	X	
S. prestoniae "Carmian"	A	good	X	X	X	
S. prestoniae Donald Wyman	A	good	X	X	X	Single, redish purple
S. prestoniae James McFarlane	A	good	X	X	X	Single, pink
S. prestoniae Royalty	A	good	X	X	X	
S. prestoniae Valeria	A	good	X	X	X	
S. vulgaris, Common Lilac	A	good	X	X	X	Single, lilac
S. vulgaris Belle de Nancy	A	good	X	X	X	Double, Rose-Pink
S. vulgaris Edward Harding	A	good	X	X	x	Double, Magenta

NAME	HARDINESS	USEFULNESS	RESIDENTIAL	COMMERCIAL	NURSERY PRODUCTION	COMMENTS
Viburnum opulus, European Highbush Cranberry	A	good	limited	X	X	
V. opulus nanum, Hedge viburnum	A	good	XX	X	X	
V. opulus "sterile" (Roseum) European Snowball	A	good	X	X	X	
Weigela Bristol Ruby"	C	good	0	0	0	
Weigela florida venusta	C	good	X	0	0	
W. Newport Red (Vanicek)	C	good	X	0	0	
W. Rosabella	C	good	0	0	0	

Nursery Production Recommendations:

Whether or not a variety was recommended for production by nurseries in New Brunswick was dependant on hardiness, horticultural value and growth rates. In some cases where several varieties had similar characteristics, only the best ones were recommended under this column.

Recommendation For Use Guide:

o - not recommended
x - recommended
xx - highly recommended
limited - generally useful where space or situation permit
trial - worth testing on other sites

VARIETIES OF SPECIAL NOTE:

Below are listed a few varieties from our trials which were considered exceptional, or worth special mention due to their usefulness as ornamental material in our area.

Upright Junipers:

Juniperus communis suecico major, Swedish Juniper - a very hardy broad columnar upright, with blue-green foliage. *J. scopulorum "Moonglow"* - a slow growing, pyramidal juniper with blue foliage worth commercial trial.

Juniper Ground Covers:

J. horizontalis "Prince of Wales" - excellent dense, symetrical shrub, dark green, and only 7 cm in height. *J. horizontalis "Waukegan"* - best of the blue foliage prostrates, denser than Blue Rug and Glauca; 7 cm in height. *J. horizontalis plumosa* and *plumosa compacta* - Andorra junipers - useful prostrate types, with green foliage turning to purple in the fall; 30 cm in height.

Juniper Spreaders for the home landscape:

J. sabina, Savin juniper - remains one of the best green foliage spreaders; moderate vigor. *J. sabina "Blue Danube"* - a good grey-green foliage type. *J. sabina "Hicksii"* - a good blue-green foliage type.

Vigorous spreaders for commercial landscapes:

J. gluaca hetzii - very vigorous, hardy blue green spreader with upright foliage. *J. sabina von eron* - vigorous with green foliage, slightly lower growing than "hetzii".

Arborvitae:

Thuja occidentalis fastigiata, pyramid cedar - this older selection remains one of the best pyramid types. It is the most vigorous, fastest growing selection with dense, dark green foliage. *T. occid. "Emerald"* or *"Smaragd"* - an excellent very dense pyramid with bright green foliage, moderate growth. *T. occid "Brandon"* - a very dense pyramid, similar in color to "fastigiata" but slower growing.

Broadleaf evergreens:

Cotoneaster dammeri - worthy of more use in the home landscape. Roots are not hardy if exposed to low soil temperatures. *Pyracantha coccinea "Kasan"* - surprisingly hardy. When grown as a ground cover, dieback occurs if exposed to winter winds. It may prove useful where snowcover is dependable.

EVALUATION OF ASPARAGUS CULTIVARS
PROGRESS REPORT

BY

RENALD CORMIER, EMERY BERNARD[1]

Abstract: Ten asparagus cultivars established in 1980 at the Hoyt Horticultural Center have performed well. Observation in the spring of 1981 showed that all cultivars overwintered well. Initial data collected in 1981 included date of emergence, number of spears, percent survival and height of plant. Results to date are promising for a future development in asparagus production for New Brunswick. Next spring will be the first harvest.

INTRODUCTION: In the last few years, considerable interest has been shown by various producers throughout New Brunswick in the production of asparagus. Two (2) hectares were established in 1981 in Gloucester County and an additional three (3) hectares will be permanently established in 1982.

This cultivar evaluation is part of a national asparagus research program under the direction of Dr. H. T. Tiessen of the University of Guelph which is being funded through the new Crop Development Program. This program is in large geared to variety evaluation and improvement, but also will undertake to evaluate various cultural practices and nutritive requirements.

METHODS: Seeds of ten (10) different cultivars were seeded in the greenhouse in the spring of 1980 and field transplanted in June of 1980.

In the spring of 1981, the ferns from last year's growth was removed and 450 kg/hectare of 15-15-15-.2B fertilizer was applied as a sidedressing. An additional sidedressing of 140 kg/hectare of ammonium nitrate was applied in early August. Fertilizer in both cases was mixed in the top inch of soil and then watered in.

---

[1] Respectively Vegetable Specialist and Vegetable Technician, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

The cultivars under observation are:

Viking 2K
Lucullus Early
Lucullus Mid-Season
Diane (Double Hybrid)
W.S.U. Hybrid #1
U. California 66 Moxee
U. California 66 Fus. Res.
Martha Washington (Old Ben Smith)
56x14-MM (Rutgers)
Rutgers 56x14-4

Weed control was carried out by hand incase herbicides would interfer with cultivar performance.

OBSERVATIONS: Harvest in newly established asparagus fields begins in its third year following field planting (e.g. transplanted in spring, 1980, harvest spring 1982). This allows the root system to fully develop and thus provide stronger crowns for the duration of the planting.

Spears of the earlier cultivars emerged around May 1st. The cultivar U. California 66 Fus. Res. and Viking 2K, which is recommended by the Atlantic Provinces Advisory Committee, were the first to emerge. The later varieties to spear out were the Lucullus cultivars and Martha Washington (Old Ben Smith).

Two frosts recorded in mid-May caused some injury. Therefore, earlier developing cultivars would be more susceptible to frost injury.

The Californias and Rutgers cultivars produced a greater number of spears.

No apparent winter injury was observed as all crowns survived and produced a good number of spears.

In mid-summer, the Rutgers strains were showing more fern height.

CONCLUSION: Again, these observations are too preliminary for any conclusions to be drawn. However, next year's harvest will help better evaluate cultivar performance.

SCHEDULING WAX BEAN PRODUCTION

BY

P. J. SMITH AND G. S. READ[1]

Abstract: Wax bean scheduling using growing degree days (5°C) to plan planting and harvesting dates was used in Kent County, New Brunswick. Maturity dates of varieties are dependent upon the amount of heat they receive during the growing season. Using this relationship, planting dates were staggered to distribute the harvesting operations over several days. Initial results were encouraging.

INTRODUCTION: Heat units expressed as Growing Degree-Days (G.D.D.) can be used to schedule the planting of bean varieties so that harvest will be spread over a period of time that will allow an orderly efficient harvest of quality beans without overloading processing facilities. This heat unit approach has been successfully used in several other areas of Canada in recent years. Details of the techniques involved can be found in the publication Growing Degree-Days and Crop Production in Canada (Publication #1635, Agriculture Canada, 1977).

METHODS: 1. General - In order to prepare such a planting schedule, the following information is required:

1. A table of Normal (30 year average) Growing Degree-Day Accumulations for the nearest weather station representative of the field where beans are to be planted;

2. Total number of Growing Degree-Days required by each variety being planted to reach maturity;

3. Proposed date of first planting, usually determined by grower experience and risk of frost;

4. Typical planting and harvest rates expressed in hectares (acres) per day;

5. The number of hectares (acres) of each variety to be planted.

---

[1] Agroclimatologist and Climatological Technician respectively, New Brunswick Department of Agriculture and Rural Development.

This information is used in the following manner. Planting of the earliest maturing variety begins on the initial planting date and continues until the total area planted equals about three times the area that can be harvested in one day. Normal G.D.D. information is used to calculate the expected date of maturity at which time harvest would begin for the first planting. The number of days required for this first harvest is calculated by dividing the total area planted by the harvesting rate.

When this harvest is finished, beans from a second planting should be ready to harvest. The planting dates for this second planting are calculated by using the G.D.D. rating of the variety and working backwards from the desired harvest date. This process is repeated in sequence until the entire crop has been sown.

2. Scheduling Bean Production in Kent County - This scheduling procedure can be illustrated by using weather data from Buctouche, Rexton and Harcourt, all located in Kent County. Similar calculations can be made for other sites in Kent County as more weather data becomes available. Climate conditions at these three sites have been summarized in Table I, showing the average dates of last spring and fall frost ($0^{o}C$), the average length of the frost-free period and seasonal totals of Growing Degree-Days and Corn Heat Units.

Frost risk data are only available for Rexton (Table II) but can be used as a guide for the other two sites. There is only a 10% chance of frost at Rexton after June 8 (20 days later than the average date of May 24). There is only a 10% chance of frost before September 8 (8 days earlier than the average date of September 16). At this risk level (10%), the bean growing season at Rexton is considered to be June 8 - September 8 (92 days). Using the same spread in frost risk at the other two sites as a rough guide, the bean growing season at Buctouche becomes June 7 - September 22 (107 days) and at Harcourt becomes July 5 - August 27 (53 days). While these growing seasons have a very low risk of frost injury, their short duration can severely limit the range of varieties that can be grown and the length of time over which harvesting can be spread.

Clearly, the risk of frost and the desired production levels have to be balanced in a reasonable manner. For the purpose of this example, planting will begin on the average date of the last spring frost.

Four varieties of beans were selected for these calculations: Gold Rush Wax; Midas Wax; Early Gallatin; Bush Bluelake. Their G.D.D. ratings and days to harvest as determined in Nova Scotia are listed in Table III. For each variety, several planting dates were selected, and the average date of harvest (maturity) was calculated, along with the average number of days required in Buctouche, Rexton and Harcourt (Table III).

RESULTS: Several interesting observations can be made from these data:

1. For any planting date, beans mature earliest at Buctouche slightly later at Rexton and latest at Harcourt, due to climate differences.
2. For any location, the earlier the planting date, the greater the number of days that are required to reach maturity, because there are fewer heat units available on earlier spring days.
3. Regardless of planting date, more days are required for maturity at all locations, than are needed in Nova Scotia, again due to differences in climate.

TABLE 1. Normal Climatic Data for Three Locations in Kent County, N.B. (1941-1970).

Station	Elevation (m) A.S.L.	Frost Dates		Frost-Free Period	Heat Units		
		Spring	Fall		G.D.D. $5^{o}C$	G.D.D. $10^{o}C$	CHU
Buctouche	8	May 27*	Oct. 1*	126*	1540**	826**	2498**
Rexton	5	May 24	Sep. 16	114	1487	774	2297
Harcourt	45	June 15*	Sep. 4*	80*	1387**	671**	1907**

* Estimated data from less than 30 years of records.

** Growing degree-days (G.D.D.) values are average totals during May 1 - Sept. 30. Corn Heat Units (C.H.U.) are accumulated between average planting date and average date of first fall frost.

TABLE 2 . Frost Risk Dates at Rexton, N.B.

	Earliest	90%	70%	50%	30%	10%	Latest
Spring	May 2	May 11	May 19	May 24	May 29	June 8	June 19
Fall	Aug 31	Sep 8	Sep 12	Sep 16	Sep 20	Sep 27	Oct 6

TABLE 3 . Normal Harvest Dates and Days* to Maturity for Three Varieties of Bean, using Four Planting Dates at Three Locations in Kent County, N.B.

Bean Variety	Heat Units	N.S. Days	Plant Date	Normal Harvest Dates (Days)		
				Buctouche	Rexton	Harcourt
Bonanza Wax	882	63-65	May 15	Aug. 4 (80)	Aug. 5 (81)	Aug. 9 (85)
			May 25	Aug. 8 (75)	Aug. 9 (76)	Aug. 13 (81)
			June 4	Aug. 13 (70)	Aug. 15 (72)	Aug. 20 (77)
			June 14	Aug. 21 (68)	Aug. 23 (70)	Aug. 28 (75)
Midas Wax	945	66-68	May 15	Aug. 8 (84)	Aug. 10 (86)	Aug. 15 (91)
			May 25	Aug. 12 (79)	Aug. 14 (81)	Aug. 19 (86)
			June 4	Aug. 18 (75)	Aug. 20 (77)	Aug. 25 (83)
			June 14	Aug. 27 (73)	Aug. 28 (75)	Sep. 3 (81)
Early Gallatin	957	67-69	May 15	Aug. 10 (86)	Aug. 11 (87)	Aug. 15 (91)
			May 25	Aug. 13 (80)	Aug. 15 (82)	Aug. 19 (86)
			June 4	Aug. 19 (76)	Aug. 21 (78)	Aug. 26 (83)
			June 14	Aug. 27 (74)	Aug. 30 (77)	Sep. 6 (84)
			July 1	Sep. 14 (74)	Sep. 18 (78)	Oct. 1 (90)
Bush Blue Lake 47	988	70-73	May 15	Aug. 11 (87)	Aug. 13 (89)	Aug. 18 (94)
			May 25	Aug. 15 (82)	Aug. 17 (84)	Aug. 22 (89)
			June 4	Aug. 21 (78)	Aug. 23 (80)	Aug. 29 (86)
			June 14	Aug. 29 (76)	Sep. 1 (79)	Sep. 8 (86)

* In calculation of (Days), day of planting and harvesting are excluded.

To date, a detailed examination of actual harvest dates in 1981 has not been done. A preliminary look has shown reasonable accuracy but some modifications may be required depending upon our findings.

Limitations to the Heat Unit Method:

1. Planting and harvest schedules for beans can be prepared only for sites which have three or more years of representative weather data. Other sites will have to be estimated subjectively until adequate data can be collected.

2. The calculations in these tables are based upon average values of Growing Degree-Days above 5°C. This means there is a 50% chance of having more heat units than normal accumulated during the growing period which would cause harvest dates to occur earlier and closer together. This could result in beans becoming over-mature before harvest can be completed. One future refinement of this scheduling procedure would be to use heat unit probabilities or risk levels to overcome this potential problem.

3. Growing Degree-Days are based only upon air temperature. Since several other factors can influence the rate of plant development, it should be understood that the heat unit concept is a simple, but not perfect approach.

The heat unit ratings for other bean varieties may not be readily available for this type of scheduling technique. Heat unit ratings determined at inland sites may not be applicable to coastal climates. Further research could develop improved methods for predicting crop maturity.

Harvest Date Forecasts

While the method of scheduling planting dates as outlined above uses climatic data averaged over a 30-year period, it is also possible to use weather observations taken after the date of planting in the current year to produce a "forecast" of expected harvest date for the current year. This will take account of periods of unusually warm or cool weather. These "forecasts" can be made bi-weekly after planting, and weekly when close to harvest date.

THE INFLUENCE OF BORON ON QUALITY AND YIELD OF BRUSSELS SPROUTS

PROGRESS REPORT

BY

RENALD CORMIER, UMESH GUPTA AND EMERY BERNARD[1]

Abstract: A three (3) year trial was established at Rogersville, New Brunswick, to determine any boron toxicity or deficiency symptoms on Brussels sprouts and the residual boron in the soil. Results in 1980 showed that the level of boron in plant and soil increased with increasing rates of soil applied boron. No toxic levels were observed. The results of the 1981 trial will become available in early 1982.

INTRODUCTION: The Rogersville and Acadieville area of New Brunswick is known as the Brussels sprouts capital of Canada. Boron, along with Molybdenum, are the most important minor elements in the fertilization of Brussels sprouts. This trial was undertaken to help determine the optimum application of boron for this crop.

The importance of knowing the optimum need of boron for Brussels sprouts increased with the growing interest of including snap beans in the rotation. Beans are quite sensitive to excess Boron. Yield of beans grown in 1981 on fields exceeding 1 p.p.m. of Boron were, in many cases, significantly lower than on fields where the Boron level was less than 1 p.p.m.

MATERIALS AND METHODS: The site was the same as last year, e.g. Mr. Roger Richard's farm in Acadieville. The original level of Boron in the field was 0.3 p.p.m. This year, a fifth level of Boron was added to the trial. The five levels of Boron used are: 0 kg/ha, 2.3 kg/ha, 4.5 kg/ha, 9 kg/ha and 18 kg/ha. The objective was to grow Brussels sprouts on the same location for three (3) years and study the effect of Boron on plant growth and how long it remains in the soil.

---

[1] Vegetable Specialist, New Brunswick Department of Agriculture and Rural Development; Research Scientist, Canada Department of Agriculture; and Vegetable Technician, New Brunswick Department of Agriculture and Rural Development.

Fertilizer was applied in bands. Transplanting was done by hand on June 18th and 19th.

About 1/5 of the plants had to be replaced in mid-July resulting in the plants being non-uniform at harvest.

Tissue and soil samples were taken when the bottom sprouts were beginning to form.

RESULTS AND DISCUSSION: Brussels sprouts were not harvested because the plants were not uniform in size. Results from tissue and soil samples for the 1981 crop will only be made available in January after the publishing of this report.

Last year's results indicate an increase in the level of Boron in both the soil and tissue as the rate of soil applied Boron was increased. The highest level of soil applied Boron giving a soil reading of 7.6 p.p.m. was not toxic to the Brussels sprout plants. Tissue analysis showed levels of boron to be as high as 123 p.p.m. which is considered high, but still not toxic.

It will be interesting to see if the 18 kg/ha rate added to the experiment in 1981 will cause any toxicity. The analysis results in January will also give some indication as to the residual effect of Boron in the soil.

CONCLUSION: One year still remains for this trial. Greenhouse trials will be carried out during the 1981-1982 winter months to further determine the effects of Boron on Brussels sprouts and snap beans. This information will be very valuable for the Brussels sprouts producers.

EVALUATION OF THE EFFECTS OF ANTI-CRUSTANTS ON CARROT EMERGENCE AND YIELD

PROGRESS REPORT

BY

KAREL T. V. MICHALICA AND RENALD C. CORMIER[1]

Abstract: Sawdust was the most effective of five tested anti-crustants. It increased emergence, yield of Canada No. 1 grade and total yield of carrots up to 76.8%, 29.3% and 18.7% respectively. Positive effect of Super Sluper, gypsum and latex** (listed in order of their decreasing effectiveness) was smaller. Besides sawdust, gypsum was the only other anti-crustant with the uniform positive effect on yield. Large variation of yield was found among treatments of Super Sluper and latex. Lignisol*** had neither positive effect on emergence nor on yield.*

INTRODUCTION: Two of five anti-crustants tested during 1980, namely Vama**** and Latex** increased significantly carrot emergence. They were intended to be tested further in 1981. Inavailability of Vama led to its substitution by another commercial industrial product - Super Sluper. Three other anti-crustants tested along with the two mentioned above were as follows: gypsum, Lignisol and sawdust.

Sawdust and gypsum were included into the trial because of their additional positive long-term effect on soil condition, Lignisol for its availability (waste product) and minimum costs.

METHODS: Silty loam Interval soil was prepared by a rototiller to a depth of 30 cm. Carrots (Daucus Carrotta) were seeded June 18th in three bands (45 cm apart) which were placed in a raised bed (183 cm wide). Randomly selected 5 m portions of outside rows seeded by the same seeder were used. The anti-crustants were placed on approximately 15 cm wide bands immediately over the soil covered carrot bands, and, with the exception of the sawdust, lightly raked in. The seedlings were counted 14 days after seeding. Harvested carrots (October 6th & 7th) were sorted out into categories of Canada No. 1, Canada No. 2 and cull and subsequently counted and weighed.

---

* Super Sluper, a starch polymer, manufactured by Henkel Co.

** Latex, polyvinyl acetate (Vult-Acit RV -462 -7A) distributed by General Latex Inc. Canada.

*** Lignisol, dry waste sulphite liquor from Ste. Anne Nackawic paper mill.

**** Vama, vinyl acetate maleic acid polymer distributed by Monsanto Canada Ltd.

[1] Soil Surveyor and Vegetable Specialist, respectively, New Brunswick Department of Agriculture and Rural Development.

RESULTS: Carrot emergence under various treatments are presented in Table I, yields (number of harvested carrots and weight of various grades) are presented in Table II.

TABLE I

TREATMENT		NUMBER OF EMERGED CARROTS 14 DAYS AFTER SEEDING PER 5 M ROW	DEVIATION FROM CONTROL %
Amendment	Amount		
Control	0	242.6	0
Gypsum	325 kg/ha	309.7	27.7
	650 kg/ha	362.0	49.2
	1.3 T/ha	354.7	46.2
	2.6 T/ha	326.3	34.5
Lignisol	650 kg/ha	254.0	4.7
	1.3 T/ha	241.3	- 0.5
Latex(10%)	650 l/ha	301.7	24.4
	1300 l/ha	294.7	21.5
	2600 l/ha	321.0	32.3
Super Sluper	16.2 kg/ha	328.3	35.3
	32.5 kg/ha	358.0	47.5
	65.0 kg/ha	337.6	39.2
	97.5 kg/ha	398.7	64.3
	130.0 kg/ha	382.7	57.7
Sawdust	6.5 T/ha	365.7	50.7
	13.0 T/ha	429.0	76.8
	26.0 T/ha	318.0	31.1

Sawdust, Super Sluper, gypsum and latex positively affected the emergence of carrots by up to 76.8%, 64.3%,

TABLE 2

Count and Yield of Carrots as Affected by Various Anticrustants

Treatment		Yield (#1 Grade)		Total Yield		Weight Deviation From Control, ±%		Remark	Yield (Cull)	Deviation From Control ±%	Remark
Ammendment	Amount	Count (5 m)	T/ha	Count (5 m)	T/ha	#1 Grade	Total Yield		T/ha		
Control		167	47.2	258	63.0	0.0	0.0		9.8	0.0	
Gypsum	325 kg/ha	181	48.2	283	62.0	+2.1	-1.6		9.5	-3.1	
	650 kg/ha	140	41.7	216	53.2	-11.7	-15.6		7.2	-26.5	small proportion of cull
	1.3 T/ha	220	53.8	317	65.6	+14.0	+4.1	Uniform Size	6.6	-32.7	
	2.6 T/ha	201	50.2	281	66.9	+6.4	+6.2	Uniform Size	7.2	-26.5	
Lignisol	650 kg/ha	174	43.3	270	60.4	-8.3	-4.1		10.2	+4.1	
	1.3 T/ha	140	43.6	208	60.0	-7.6	-4.8		11.5	+17.3	
Latex (10%)	650 l/ha	159	44.0	242	60.4	-6.8	-4.1		9.8	0	
	1,300 l/ha	215	54.1	307	65.9	+14.6	+4.6	Uniform Size	7.2	-26.5	
	2,600 l/ha	192	43.0	303	60.4	-8.9	-4.1		12.5	+29.6	
Super Sluper	16.2 kg/ha	129	37.1	215	58.4	-21.4	-7.3		16.7	+70.4	
	32.5 kg/ha	201	47.6	335	65.9	+.8	+4.6		12.1	+23.5	
	65.0 kg/ha	225	57.4	308	67.9	+21.6	+7.8	Uniform Size	6.6	-32.5	
	97.5 kg/ha	203	47.6	343	67.9	+.8	+7.8		14.8	+51.0	
	130.0 kg/ha	237	54.8	336	68.9	+16.1	+9.4		7.9	-19.4	
Sawdust	6.5 T/ha	188	50.5	305	65.9	+7.0	+4.6		5.9	-39.8	small proportion of cull
	13.0 T/ha	252	61.0	345	74.8	+29.3	+18.7	Uniform Size	8.9	-9.2	
	26.0 T/ha	301	60.0	353	71.2	+27.1	+13.0	Uniform Size	7.9	-19.4	

49.2% and 32.3% respectively. Lignisol affected emergence very little. In terms of total yield and Canada No. 1 carrots, from all amendments, sawdust affected positively both in the greatest magnitude. The largest increase of total yield (18.7%) and Canada No. 1 yield (29.1%) was obtained under the treatment of 13 T per hectare of sawdust. The positive effect of Super Sluper was not uniform. The largest increase of the total and Canada No. 1 yield (7.8% and 21.6% respectively) was obtained under application of 97.5 kg per hectare. The positive effect of gypsum was still smaller and varied. The largest increase of the total and Canada No. 1 yield (4.1% and 14.0% respectively) was obtained under treatment of 1.3 T per hectare. Only one of three soil treatments with Latex (1,300 l per hectare) had a positive effect on yield. Both lower and higher amounts applied to the soil affected the yield negatively. Lignisol had a negative impact on yield.

The results show a positive effect of gypsum on production of high proportion of Canada No. 1 and No. 2 carrots in comparison with cull. It was also observed that carrots developed longer and smoother. This trend, even though the magnitude was somewhat smaller was also observed under treatments of sawdust. The portion of cull of the total yield varied widely under treatments. Latex and Super Sluper treatments resulted in substantial increase of cull up to 70.4%.

CONCLUSIONS AND RECOMMENDATIONS: The results of the trial are so promising that it is recommended that the actual costs, yield, quality and affects on soil characteristics should be monitored in further studies.

As the amendments of sawdust and gypsum seemed to be the most prospective ones, they should be tested further on a commercial site. Further advantage of using sawdust would be in increasing organic matter and long-term natural fertility of the soil, the disadvantage would be costs and organization problems associated with the transportation and application of large volume of sawdust. The advantage of gypsum would be in its easy handling and application, the disadvantage would be its costs.

ACKNOWLEDGEMENTS: The co-operation of growers Gerald and Harry Buyting and the advice and assistance of Dr. Gulshan Saini and Mr. Nelson Adams was greatly appreciated.

REFERENCES: Doyle, J.J. and A.A. MacLean. Studies With Waste Sulphate Liquor I. Effects of Waste Sulphite Liquor on Crop Yields and on Soil Properties, Canadian Journal of Soil Science. Vol. 39 No. 2, 1959. p. 87-91.

Michalica, K.T.V. and Renald C. Cormier. Evaluation of the Effect of Anticrustants on Carrot Emergence in the Field. Progress Reports, New Brunswick Department of Agriculture and Rural Development. 1980. p. 117-120.

Canadian Agricultural Products Standard Act, 1977. p. 84-88.

PRELIMINARY REPORT ON THE USE OF A PREDICTIVE SCHEME FOR SCHEDULING FUNGICIDE SPRAYS TO CONTROL CARROT BLIGHT

BY

K. V. LYNCH[1], G. S. READ[1] AND G. BUYTING[2]

Abstract: A scheme for scheduling fungicide sprays to control carrot blight based on weather information was applied with good success. The percent blight at the end of the season was not high enough to cause mechanical harvesting losses and a significant reduction in the number of sprays applied was achieved.

INTRODUCTION: Carrot blight induced by *Alternaria dauci (Kuhn)* Groves and Skolko and *Cercospora carotae (Pass.)* Solh. occurs every year in New Brunswick. Sprays at 7 to 10 day intervals are required from August to October to control blight. When greater than 10-20 percent of the leaf area is blighted, yield reduction occurs due to petiole breakage during mechanical harvesting. The number of hours of leaf surface wettness required for infection to occur decreases with higher temperatures and increases with lower temperatures (Gillespie and Sutton, 1979). This relationship between required hours of leaf surface wettness and temperature allows the use of precipitation and temperature forecasts to predict probable infection periods. Protective fungicide sprays are then applied in accordance with these forecasted periods rather than on a 7-10 day schedule.

METHODS: A program of weather-timed sprays for blight control was applied to 56 hectares in the Sheffield area near Fredericton. This total area consisted of four fields designated 1, 2, 3, 4 having 26, 8, 3 and 19 hectares, respectively. The varieties grown were Field 1 Hipack, Field 2 Hipack and Candy Pak, Field 3 Candy Pak and Field 4, Hipack and Orange Sherbet.

---

[1] Pathologist and Climatological Technician, respectively, New Brunswick Department of Agriculture and Rural Development.

[2] Grower, R. R. #2, Maugerville E3B 4X3.

A "typical" spray program might extend from August 7th to October 15th an involve 6-9 sprays. In a program involving weather-timed sprays for blight control, the first spray is not applied until a threshold disease ratio of one plant infected in four is reached. Monitoring of disease levels was done by taking samples of 50 leaves from each of the four fields at weekly intervals. Starting seven days after the first spray application, the grower received daily three-day forecasts for precipitation and temperature direct from the Fredericton Weather Office of the Atmospheric Environment Service. These forecasted weather conditions were then used to schedule sprays according to Table I. Metiram (Polyram 80 W) at 1.8 kg ai per ha was used for all sprays except September 18th when chlorothalonil (Bravo 500) was applied at 1.0 kg a.i. per ha. Disease levels were assessed prior to harvest for both number of plants infected and percent leaf area blighted.

TABLE I: FORECASTED WEATHER CONDITONS AND SPRAY RECOMMENDATION (ADAPTED FROM SUTTON, 1979)

Forecast	Recommendation
Minimum temp. less than 9°C	No spray
Minimum temp. greater than or equal to 14°C	Spray
Minimum temp. between 9-14°C	
- rain forecasted	Spray
- no rain forecasted	No Spray

RESULTS: Field 1 reached a disease level threshold of one plant infected in four on August 25th at which time the first spray was applied. Forecasted weather conditions directed the use of three additional sprays on 4, 11 and 18 September. Fields 2 and 3 reached their disease threshold on September 11th and only one additional spray was applied on the 18th. Field 4 reached its disease threshold on September 4th and additional sprays were applied on the 11th and 18th of that month. For a comparison to a normal 10-day spray schedule (6 sprays), 2, 4, 4 and 3 sprays were saved for fields 1, 2, 3 and 4 respectively. Harvesting was done from September 22nd to October 31st with no ascertainable losses attributable to blight. Specifics of blight levels are given in Table II.

TABLE II: PERCENT BLIGHT PRIOR TO HARVEST

Field	Date of Assessment	Number of Leaves Infected Per 100	Percent Leaf Area* Infected
1	Oct. 20	66	4.2
2	Oct. 25	42	0.8
3	Oct. 8	16	0.2
4	Sept. 28	24	0.4

*Leaves with a disease rating of 0 included.

CONCLUSION: Preliminary results indicate that a predictive scheme for scheduling fungicide sprays to control carrot blight can be used in this area. Weather forecasts are available and their interpretation in terms of a spray schedule are easily made. Blight is controlled when spraying is done according to a predictive scheme and economic benefits occur.

REFERENCES: Gillespie, T. J. and J. C. Sutton. 1979. A predictive scheme for timing fungicide applications to control alternaria leaf blight in carrots. Can. J. Plant Path. 1:95-99.

Sutton, J. C. 1979. Weather-timed sprays for carrot blight control. Factsheet Agdex 258/635.

CALCIUM AS IT AFFECTS BLACK HEART IN CELERY

PROGRESS REPORT

BY

R. CORMIER, A. GHANEM, R. BUCHANAN[1]

Abstract: A trial to evaluate the effects of four (4) different levels of calcium chelate on black heart in celery was conducted in 1981. No black heart was observed for any of the calcium treatments. However, very noticeable boron deficiency symptoms were observed on the field where the soil sample readings showed the higher calcium level.

INTRODUCTION: At the request of growers in the Maugerville area, a trial was initiated to determine the effects of calcium in reducing black heart in celery. Over the years, many growers have been experiencing problems in growing celery. They were getting some breakdown in the center of the celery plant and were attributing this to a lack of calcium uptake by the plant. If a solution to the problem could not be found, growers said that they would stop growing celery altogether.

MATERIALS AND METHOD: This trial was conducted on the farms of Karl Harvey and Charles Harrison in Maugerville. Four rates of calcium chelate 0 l/ha, one foliar spray of 7.18 l/ha, two foliar sprays of 7.18 l/ha each, and three foliar sprays of 7.18 l/ha each were applied to well established celery plants. Sprays were applied on July 8, 18 and 26 of 1981.

Calcium chelate has a guaranteed calcium content of 6 percent minimum. Tissue and soil samples were taken prior to beginning the calcium sprays and again in mid August prior to harvest.

---

[1] Vegetable specialist, Soil specialist, Soil technician, New Brunswick Department of Agriculture and Rural Development.

TABLE I - Levels of Calcium and Boron in Plant Tissue and Soil

SOIL ANALYSIS				TISSUE ANALYSIS		RATE OF CALCIUM CHELATE APPLIED
FIELD NO.	pH	Ca (Kg/ha)	RATING	Ca (%)	Bo (ppm)	L/ha
#1	5.3	1495	medium	.85	42	0
	5.2	1487	medium	1.1	51	7.18
	5.8	1783	medium	1.0	43	14.36
	5.4	1613	medium	.88	43	21.54
	6.9	2253	high	1.6	27	0
	7.3	2150	medium	.85	20	0
	7.0	2585	high	1.1	24	7.18
	7.0	2276	high	1.3	41	7.18
	7.1	2173	medium	1.5	26	14.36
	7.2	2612	high	1.2	35	14.36
	6.9	3562	very high	1.1	19	21.54
	7.3	1644	medium	1.0	21	21.54

RESULTS AND DISCUSSION: No calcium plant deficiency symptom (black heart) was observed in either fields at any of the four (4) levels of calcium chelate used. The results from one year's work indicate that tissue levels of calcium in celery above 0.85 percent is sufficient to prevent black heart (Table 1). It would be interesting to find out at what levels deficiencies begin to appear. There was no marked significant increase in levels of calcium in tissue with increased rates of foliar applied calcium. It is also interesting to note that no calcium deficiency symptom appeared even at the lowest soil calcium reading of 1487 kg/ha (table 1).

Severe boron deficiency (stem cracking) occured in field No. 2 where the calcium levels in the soil were the highest even though the tissue samples taken prior to applying calcium sprays showed the boron reading to be equal in both fields (Table 1).

The higher calcium level interfered with the boron absorption by the plant. Therefore, on soils with a high calcium reading, growers should foliar spray the boron to the celery plants to prevent any boron deficiency even if the original boron level in the soil is high.

CONCLUSION AND RECOMMENDATIONS: Tissue levels of .85% calcium did not produce any black heart in celery. Further work is required to determine at what tissue level calcium deficiency symptoms begin to appear.

Boron deficiency symptoms occurred in the field where the soil calcium content was in the high range of medium to high. To prevent boron deficiencies foliar sprays of boron are required where the calcium level in the soil is high.

MONITORING MOTH FLIGHTS OF CORN INSECTS USING BLACK LIGHT INSECT TRAPS

BY

D. B. FINNAMORE[1]

Abstract: Four black light insect traps were placed in different areas to monitor moth flights of the European corn borer and corn earworm.

INTRODUCTION: This project was undertaken to evaluate the use of a black light insect trap to monitor adult activity of two major corn insects, namely the European corn borer and the corn earworm. These two insects are major pests of sweet corn and growers have to apply insecticides to control the insects. If flight periods of the adult moths could be determined, by black light traps, growers would be alerted to such periods and the application of insecticide sprays would be timed more precisely. If no adult moths were captured in the trap, then it would not be necessary to apply insecticides, thus lowering the cost of sweet corn production and reducing the insecticide impact on the environment.

METHODS: Four, Ellisco, General Purpose 15-Watt "Black Light" Insect Traps were purchased to monitor moth flights of European corn borers and corn earworms. The traps were placed at four locations and individuals were found to tend the traps and empty the nightly moth catches each day.

The daily catches were placed in a mailing container and each catch was separated by a layer of cotton wool. The container was mailed weekly or as soon as it became full with moths, to Dr. H. Specht, Canada Agriculture, Research Station, Kentville, N. S., where the moths were identified.

---

[1] Provincial Entomologist, New Brunswick Department of Agriculture and Rural Development.

Light traps were placed on the farms of Mr. K. Harvey, Maugerville, Sunbury Co.; Mr. A. McDonald, MacDonalds Pt., Queens Co.; Mr. R. Pope, Belleisle Creek, Kings Co.; and at the New Brunswick Department of Agriculture and Rural Development Horticultural Center, Hoyt, Sunbury Co. Traps were operated from the first week in May, until the last week in August.

RESULTS: One light trap, at MacDonalds Pt., Queens Co., was lost to vandalism in the first week of May. Another unforeseen factor was the stoppage in postal service for about six weeks, during this time catches could not be forwarded for identification. This six week period, late June until early August, would coincide with European corn borer and corn earworm moth activity. The trap at Maugerville was not operated after the stoppage of postal services.

Table I shows the dates and the number of European corn borer moths captured.

Table II shows the dates and the number of corn earworm moths captured.

Trap #1 - Belleisle Creek, Kings County.
Trap #2 - Maugerville, Sunbury County.
Trap #3 - Hoyt, Sunbury County.

TABLE I. European Corn Borer Moth Captures 1981

	Trap #		
	1	2	3
June 14	-	1	-
June 19	-	1	-
August 4	2	-	-
TOTAL	2	2	-

TABLE II. Corn Earworm Moth Captures 1981

	Trap # 1	Trap # 2	Trap # 3
August 4-5	1	-	1
August 15-17	4	-	1
August 15-23	-	-	3
TOTAL	5	-	5

DISCUSSION: It was unfortunate that a postal service disruption occurred for six weeks when peak moth flights usually occur, and also the loss of a light trap due to vandalism in the first week of operation.

Next season, trap placement on the farm to avoid vandalism must be considered. The area where the traps were placed should be reviewed, some trap caught many more moths of various species, indicating that the trap location is all important in the total number of moth species and individuals captured.

SCREENING HERBICIDES FOR THE OSTRICH (FIDDLEHEAD) FERN

BY

D.J. DOOHAN[1]

Abstract: Glyphosate and simazine were applied to dormant crowns of the ostrich fern in the greenhouse and no injury was observed when the fronds emerged. Glyphosate simazine, dicamba, cyanazine and terbacil all injured the ostrich fern when applied to expanded foliage.

INTRODUCTION: As a component of the New Crop Development Program for the ostrich fern, a greenhouse trial was initiated to screen herbicides for use as safe weed control chemicals in future field plantings.

MATERIALS AND METHODS: Crowns of the ostrich fern were planted in 10 cm clay pots on March 1, 1981 and forced in the greenhouse until March 24. At this time, more crowns were planted and two experiments were arranged, one consisting of the March 1 plants which were approaching full frond (0.5 m on average) and one consisting of the dormant plants potted the same day. Each experiment had 7 replications per treatment (Table 1) each replication a single potted plant. All the treatments listed were applied to the dormant plants and to the plants in frond with the exception of #5 cyanazine which was not applied to dormant plants. Treatments were applied on March 24 and the plants were placed in the greenhouse.

Observations on fern tolerance were made on April 7 and on April 21, 1981.

RESULTS AND DISCUSSIONS: With all the herbicides tested there was less injury when applied to dormant crowns than when applied to ferns in frond. Glyphosate and simazine when applied to dormant plants were completely safe and should be useful to give a broad spectrum of weed control when properly timed. Simazine is not considered to have foliar activity, it was therefore surprising to observe injury on the ferns treated in frond. The degree of injury from dicamba and terbacil was too severe to warrant further consideration at the present time. Although cyanazine was not tested on dormant plants it is probable that it would also have caused injury.

---

[1] Weed Specialist, New Brunswick Department of Agriculture and Rural Development.

TABLE 1.

EFFECT OF HERBICIDES ON OSTRICH FERN IN GREENHOUSE

INJURY

		April 7		April 21		
TREATMENTS	Kg/Ha	DORMANT	IN FROND	DORMANT	IN FROND	SYMPTOMS
1 check		0	3	0	2	
2 dicamba	1.0	11	29	16	37	epinasty, chlorosis necrosis
3 glyphosate	2.0	0	27	0	44	chlorosis, necrosis
4 simazine	1.0	1	8	1	36	chlorosis, necrosis
5 cyanazine	1.0		25		46	chlorosis, necrosis
6 terbacil	1.0	0	34	52	81	chlorosis, necrosis

CONCLUSIONS: Glyphosate when applied to dormant crowns of the ostrich fern did not cause any observable injury when the fronds emerged. This treatment could be used effectively against certain winter annuals and biennials in the spring and likely against certain perennials in the fall after the fronds have died down.

Simazine might be applied early in the spring before growth commences or in the fall to prevent growth of weeds from seed throughout the season. Results of this trial indicate that this treatment should be applied on small areas at first pending further research to verify its safety as a dormant spray.

CROP MANAGEMENT OF THE OSTRICH FERN[1]

INTRODUCTION

BY

B. W. DYKEMAN[2]

INTRODUCTION: A program to evaluate the feasibility of domesticating the Ostrich Fern as a processing and fresh market vegetable crop and to develop a management system for the crop was initiated in 1978. To date, a number of studies have been initiated with the goal of developing a management system for this potential crop.

A brief description of the studies underway are included herein. No yield data can be expected from this work until 1983. The trials were established on an alluvial soil near the New Brunswick Horticultural Centre, Hoyt. Plant material used were crowns from the banks of the Saint John River near Sheffield and plants grown from spores. Land was amended with 40 tonne/Ha of barnyard manure prior to planting and limed to pH 6.0.

PLANT SPACING STUDIES: A trial was established to determine the best spacing and planting arrangement for this crop. Both solid stand and bed systems are being evaluated at various plant spacings. Original plant populations under test ranged from 5,000 plants to 20,000 plants per hectare.

MULCHING STUDIES: The plant response to various organic mulches is being evaluated. Of particular interest in this study is the rate of plant establishment and rhizome spread.

SOIL FUMIGATION STUDIES: A trial was initiated to evaluate the value of soil fumigation in promoting rapid plant establishment. Preliminary results of this study are reported separately.

SHADING STUDIES: A new study was initiated in 1980 to evaluate the necessity of shade and to determine what level of shade, if any, is necessary for optimum plant growth and crop production.

---

[1] Funded by Technology Transfer Program, ASA II.

[2] Horticulturist, New Brunswick Department of Agriculture and Rural Development.

CROP FERTILITY STUDIES: No fertility work has been initiated to date. However, plants were put out in order that various fertility studies could be initiated once the planting is established.

IRRIGATION MULCH STUDIES: A study was started to determine the necessity for irrigation on the crop and to determine the levels of soil moisture required to obtain maximum plant growth. Trickle irrigation was used as the irrigation system on both mulched and unmulched plants. Irrigation will be applied at three levels: 1) no irrigation; 2) maintenance of soil at or near field capacity; and 3) irrigation to field capacity whenever soil tension reached 100 cm of water column (0.1 bar). This last study was established on upland sandy soil.

DEPTH OF PLANTING STUDY: A study was initiated in 1981 to determine the effect of planting depth on the longevity of mother plants, on the rate of rhizome production and on the growth habit of rhizomes and of daughter plants.

EFFECTS OF SHADE ON GROWTH AND DEVELOPMENT OF THE OSTRICH FERN[1]

BY

B. W. DYKEMAN[2]

Abstract: The effects of shade on growth and development of the Ostrich fern and on plant establishment were evaluated. Plant responded positively to supplemental shade during their first few years of establishment. Frond length was the only factor however which continued to be significantly affected by shade as plant stands matured.

INTRODUCTION: The Ostrich fern is generally found under conditions of intermittend shade in the wild. Therefore, one of the first questions which must be answered in any attempt to cultivate this crop is what are the effects of shade. Ideally, it would be desirable to select clones which would flourish in full sunlight. If this is not possible then a method to provide for the plants shade requirements must be developed if shading requirements exist.

In this study no attempt was made to determine the type or intensity of shade required by the plants. The objective of this study was to observe the growth factors which are affected by shade and to determine the degree by which they are affected.

METHODS: In 1977 a trial was set out using young ostrich fern crowns. An eight block RBD design was used with eight plants per plot. Only two shading treatments were evaluated, shading, 30% and non-shaded. The shade was provided by a double layer of cheesecloth supported by frames 60 cm above the plants and along the sides of the plots to within 15 cm of the ground. Moisture was provided by a trickle irrigation system. All plots were mulched with 5 cm of sawdust. Fertilizer was provided by 17-17-17 at a 100 kg nitrogen/Ha rate per year.

Data was collected on frond height, number of fronds per crown and the number of daughter plants produced.

---

[1] Financially supported by Technology Transfer Program, A.S.A. II.

[2] Horticulturist, New Brunswick Department of Agriculture and Rural Development.

RESULTS AND DISCUSSION: From the early results, it appeared clear that the Ostrich fern preferred shaded conditions for maximum growth. Shading resulted in larger fronds with a greater number produced per crown.

However, the only lasting effect of shade as stands become established appears to be on frond height. Ferns grown under 30% shade have consistently produced fronds of greater length than unshaded treatments. The difference in frond length has averaged 20% over the five years.

Shading has had no lasting significant effect on the number of fronds per crown or on plant density.

TABLE I: Effects of shade on the growth of young Ostrich fern plants - Frond Height

	Frond Height (cm)			
Treatment	Year 3	Year 3	Year 4	Year 5
0% shade	27.8	35.4	44.6	25.6
30% shade	30.7	46.4	52.5	31.2
F test	N.S.	* *	*	* *
% Difference	10.4	31.1	17.7	21.9

TABLE II: Effects of shade on the development of young Ostrich fern plants - Fronds/Crown

	No. Fronds per Crown			
Treatment	Year 2	Year 3	Year 4	Year 5
0% Shade	-	8.3	8	5.6
30% Shade	-	10.3	7	4.9
F test		* *	N.S.	N.S.

TABLE III: Effects of shade on the rate of rhizome development in a young fiddlehead planting.

Treatment	No. Daughter Crowns per Plot Year 2	Year 3	Year 4	Year 5
0% Shade	6	16	37.9	89.3
30% Shade	11.2	18	45.3	99.6
F test	**	N.S.	N.S.	N.S.
% Difference	86.7	12.5	19.5	11.5

TABLE IV: Productivity indexes during the establishment of young Ostrich fern plantings under two shade situations.

Treatment	Productivity Index (Dykeman, 1979b) 1978	1979	1980	1981
0% Shade	3.11	7.05	16.38	14.0
30% Shade	4.72	12.43	19.59	16.4
Ratio 30%/0%	1.5	1.8	1.2	1.2

Two artifacts in the data should receive some discussion. The first is the obvious reduction in frond height in 1981 across both treatments (Table 1). It is thought that this may be due to overcrowding of the plots. Plant densities reached 50 plants per M^2 in 1981. This is double the highest density ever observed in native stands (Dykeman, 1979). Its occurance is probably due to the heavy mulch utilized in the trial which has given an ideal environnement for rhizome development. This crowding has probably created considerable competition for moisture and nutrients. No other possible causes for this reduced growth can be offered at this time.

The second observation is the continual reduction observed in the number of fronds reduced per crown (Table II). This occurance may also be resulting from the overcrowding situation. This high plant density is certainly not a desirable situation and is one which must be guarded against in developing a management system for this crop.

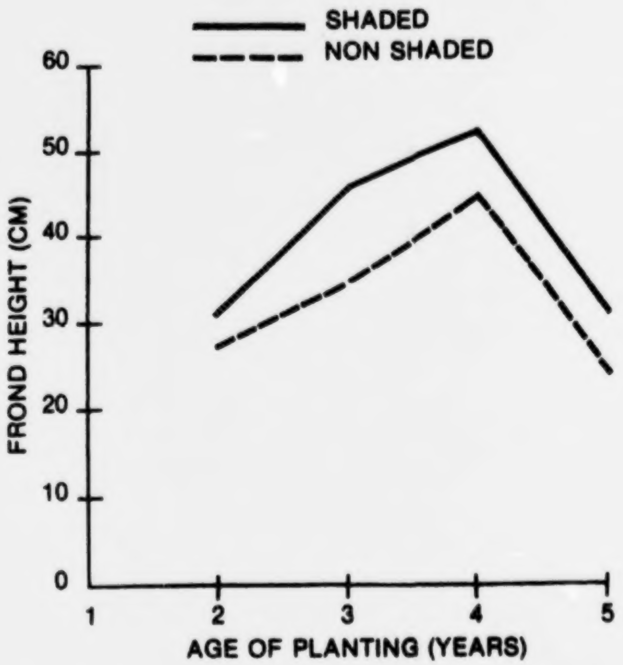


Figure I. Effect of shade on frond development in the ostrich fern

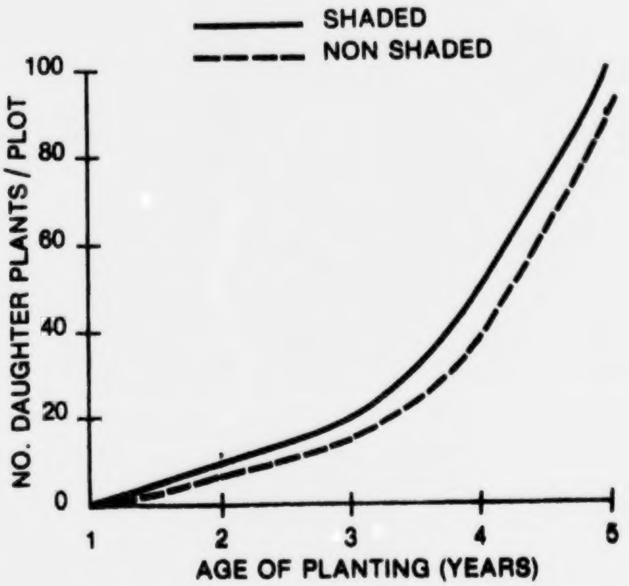


Figure II. Increase in the density of plants over time.

CONCLUSIONS: The Ostrich fern does respond positively to reduced light. Under 30% shade, the Ostrich fern produced fronds which were approximately 20% greater in length than those in an unshaded situation. It is not known at present if this also reflexs a frond with greater mass or a larger crozier initially. This will be evaluated in 1982.

This difference in frond length did not diminish as the stand of plants aged. (Figure 1).

There was no sustained difference in the plant density or number of fronds per crown between treatments.

Plant densities increased in geometric proportions over the five years (Figure II) and served to confuse the data in 1981, probably due to overcrowding.

It is not known to what degree the 20% difference in frond length would affect yield of croziers. Therefore a conclusion on expected loss (if any) in yield due to growing the Ostrich fern in full light can not be made at present.

REFERENCES: Dykeman, B.W., 1979 a. Ostrich Fern Selection Program. Adaptive Research Report, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development, pages 67-71.

Dykeman, B.W., 1979b. Ostrich Fern Clone Evaluation Program, Adaptive Research Report, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development, pages 72-77.

Dykeman, B.W., 1979c. Effects of Shade on the Ostrich Fern, Adaptive Research Report, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development, pages 78-80

Dykeman, B.W., 1980. Effects of Shade on Growth amd Development of the Ostrich Fern Adaptive Research Report, 1980. Plant Industry Branch. New Brunswick Department of Agriculture and Rural Development pages 131-134

FUMIGATION OF SOILS FOR OSTRICH FERN ESTABLISHMENT[1]

B. W. DYKEMAN[2]

Abstract: A study was initiated in 1980 to determine the growth response of Ostrich fern plants to soil fumigation prior to planting. Early results show a significant increase in daughter plant production after one year's growth in fumigated soil.

INTRODUCTION: Nothing is known at present about soil organisms (nematodes, fungi, etc.) which may attack Ostrich fern roots and affect plant establishment. Also, nothing is known regarding the possibility of a mychorrhizal relationship existing with this plant and soil fungi. To determine if some problems may exist in this area, a trial was established in 1980 to determine growth difference in young Ostrich fern plants set in fumigated and unfumigated soils.

METHODS: Young sporophyte plants produced from spores and grown in a soilless medium for one year were used in this study.

The trial was established on interval soil previously in sod, and in close proximity to natural Ostrich fern stands (6 m). Fumigation was carried out in June using the MC2 formulation of methyl bromide as directed. After aeration, all plots were planted with young sporophyte crowns.

The trial was established in a randomized block design with four replications with plots being 2 m x 6 m (12 plants/plot).

Daughter plant counts were taken in August, 1981, as a measure of rhizome development and plant vigor.

RESULTS & DISCUSSION: There was a significant response in growth to the soil fumigation (Table I). Mother plants in the fumigated plots produced 84% more daughter plants by the end of the second growing season than those in the unfumigated plots. Daughter plant production in year two is a measure of rhizome growth in the establishment year.

---

[1] Funded Technology Transfer Program, ASA II.

[2] Horticulturist, New Brunswick Department of Agriculture and Rural Development.

At this time, no attempt has been made to explain the response. Nematode counts will be taken in 1982 in the interval soil and roots of the test plants will be examined for pathogens. Also, the long term effect of soil fumigation on stand growth will be followed. Rate of spread, plant density and size will be measured over the next two years to establish the economic merits of fumigation.

TABLE I: EFFECTS OF SOIL FUMIGATION ON
DAUGHTER PLANT PRODUCTION IN THE OSTRICH FERN. 1981.

Treatment	No. Daughter Plants/Plot
Non-fumigated	18.8*
Fumigated	34.5

*Means are significantly different at the .05 level of the F test.

SUMMARY: A significant increase in rhizome growth and daughter plant production was obtained from soil fumigation prior to field planting Ostrich fern. The long-term benefits of this practice will be evaluated over the next two years.

OSTRICH FERN CLONE EVALUATION PROGRAM 1981[1]

B. W. DYKEMAN[2]

Abstract: The evaluation of 54 clones of Ostrich fern was continued in 1981. In addition, a further 1,000 clones were collected from throughout New Brunswick and planted out in single plant plots for future evaluation.

INTRODUCTION: The evaluation of Ostrich fern clones was initiated in 1978. The objective of the program was to identify genetically controlled characteristics which may contribute to the domestication of this crop and to select superior clones based on these characteristics.

METHODS: Fifty-four clones were collected in 1978 (Dykeman, 1979a) and established in six plant plots for evaluation. In 1981, an additional 1,000 clones were collected from throughout New Brunswick. These were established in single plant plots for preliminary screening.

Clones have been evaluated for rate of spread, frond size, number of fronds per crown, and chlorophyll retention under high light. A productivity index was developed for preliminary rating of clones (Dykeman, 1980). Clones were harvested in 1980 for the first time. In 1981, data collection was continued.

1981 RESULTS: The initial fifty-four clones were again evaluated for plant density, frond height, fronds per crown and date of emergence (Table I). Productivity indexes were again calculated.

Due to very high temperatures in mid-May, crozier emergence of early clones was a full seven days earlier than in 1980. These high temperatures, however, did not concentrate the emergence of all clones. The spread between early and late clones was 14 days from May 12th to May 26th. The average date for all clones was May 18th. Early clones were again injured by frost on May 18th and may account for the low fronds/crown counts on many of the early clones.

---

[1] Funded by Technology Transfer Program, ASA II.

[2] Horticulturist, New Brunswick Department of Agriculture and Rural Development.

TABLE I. PLANT GROWTH INFORMATION ON SELECTED CLONES OF OSTRICH FERN. 1981.

CLONE	DATE OF EMERGENCE	FROND HEIGHT (CM)	PLANT DENSITY CROWNS /M^2	FRONDS PER CROWN	PRODUCTIVITY INDEX
5	14/5	33	27.6	8	10.1
6	25/5	43.5	14.6	18	18.8
7	25/5	36	14.1	12	9.4
11	16/5	39	9.8	8	4.2
12	14/5	37.5	18.4	9	8.9
13	26/5	42	10.9	14	10.1
14	19/5	36	26.6	7	8.8
26	25/5	38	11.9	14	10.0
33	19/5	39.5	17.4	9	8.8
38	25/5	32.5	21.1	9	8.9
39	25/5	37.5	11.4	15	10.2
49	16/5	37	8.1	15	7.2
Mean of Selected Clones	21/5	36.6	15.5	9.1	7.5
Mean of All 54 Clones	18/5	32.9	13.8	8.9	3.6

TABLE II. COMPARISON OF PRODUCTIVITY INDEXES OF LIGHT TOLERANT CLONE NB6 WITH THE NEXT TEN BEST CLONES DURING THE THREE YEAR ESTABLISHMENT PERIOD.

	PRODUCTIVITY INDEX		
	1979	1980	1981
Clone NB6	6.0	32.2	18.8
Mean:Top 10	8.1	16.7	8.2
% Difference	-10.3%	+92.8%	+129.3%

As reported in 1980, clone NB6 is the only clone in the original 54 which appears to be tolerant to high light. Chlorophyll degradation does not appear to occur as extensively in this clone as it does in other clones under full sunlight conditions. This clone overtook all other clones in 1980 and increased that lead in 1981 (Table III). The increasing difference between clone NB6 and other clones is probably due to its light tolerance which enables it to carry on photosynthesis more efficiently throughout the growing season.

Productivity indexes were lower in 1981 than in 1980. This was due to the much lower frond height data that was recorded in 1981. It is not known by the author why these lower values were recorded. The data in 1981 was collected by a different individual and the method of measurement may have differed.

The 1,000 new clones that were collected in 1981 came from throughout the Province with clones being collected from all major waterways. Because the growing season started a full week ahead of schedule, it was difficult to find dormant crowns for collection. Because of this situation, it is suspected that crowns selected by the collector tended to be later emerging plant types. This may in fact prove to be a valuable bias since later clones are desirable in avoiding spring frosts.

SUMMARY: Evaluation continued on the original clones in 1981. NB6, a light tolerant clone, appears to be out performing all other clones.

A new collection of 1,000 clones was established in 1981.

All original clones will be harvested in 1982. Clones will be screened for degree of chlorophyll degradation under high light. Correlations between crozier size and mass with frond height will be calculated in 1982 to determine the value of the productivity index in evaluating young stands of Ostrich fern.

REFERENCES: Dykeman, B. W. 1979. Ostrich fern selection program. Adapt. Res. Rept. PIB. NBDA. 1979. p. 67-71.

Dykeman, B. W. 1980. Ostrich fern clone evaluation program. Adapt. Res. Rept. PIB. NBDA. 1980. p. 125-130.

PROPAGATION OF THE OSTRICH FERN

PROGRESS REPORT

BY

B. W. DYKEMAN[1]

Abstract: Research has been undertaken to develop an actual propagation system for the Ostrich fern. Early in vitro work has produced a tentative system, but with many details yet to be worked out.

INTRODUCTION: If the cultivation of the Ostrich fern (fiddlehead fern) is to become a reality, then a method of propagating superior clones must be developed so that commercial establishment can proceed. Propagation by spores should produce plants with considerable genetic variability. The only conventional asexual method of propagating this plant would be by rhizome cuttings. This method would not produce sufficient plant numbers to make commercial planting possible.

The development of an in vitro propagation system appears to be the only feasible approach to this problem.

PROGRESS: The Ostrich fern has proven to be a relatively undemanding plant in tissue culture. The plant will multiply readily on a very simple medium. A major problem in its culture has been finding a method of disinfestation of tissue since endogenous fungi and bacteria are both present.

Considerable work remains in obtaining good singulation of plantlets and plantlet development and in establishing and growing plants following in vitro culture.

---

[1] Horticulturist, New Brunswick Department of Agriculture and Rural Development.

COMPARISON OF CROP ROTATIONS IN THE POTATO[1] PRODUCTION SYSTEM

PROGRESS REPORT

I. GHANEM, J. DAMBOISE, J. L. DAIGLE[2]

Abstract: Field evaluation of five crop rotations has been established. Monitoring of the effect of these rotations on soil properties and potato yield and quality will continue for the next two years.

INTRODUCTION: Potato growers have been following a mono-culture intensive production system. This practice has resulted in deterioration in soil quality, i.e. increased soil compaction and erosion. Decrease in yield and quality of potato has been attributed to the mono-culture practice. The objective of this field trial is to compare and demonstrate various crop rotation systems in counteracting the adverse effect of the mono-culture system.

MATERIALS AND METHODS: Potato fields which have been in continuous potato for more than 10 years have been selected for the purpose of the field trials.

The field was divided into five sections, each section is approximately 0.7 hectare. The planned rotations are outlined in Table I.

In 1981, the first section was planted on May 9th, with Netted Gem potatoes, 925 kg. seed per hectare. 1700 kg/hectare of 10-10-10 fertilizer were used. Recommended pest control practices were followed.

The second section was planted with opal wheat on May 5th. 135 kg seed/hectare and 335 kg of fertilizer 15-15-15 per hectare were used.

The third section was planted on June 15th with buckwheat. 67 kg/seed per hectare and 115 kg of 10-20-20 fertilizer per hectare were used.

---

[1] Partially funded by Technology Transfer Program, ASA II.

[2] Soil Specialist, Crop Specialist, Soil Engineer, respectively, New Brunswick Department of Agriculture and Rural Development.

TABLE I. PLANNED ROTATION, 1980-1983

Section	1980	1981	1982	1983
1	potato	potato	potato	potato
2	potato	grain	grain	potato
3	potato	buckwheat	buckwheat	potato
4	potato	clover	clover	potato
5	potato	peas	winter grain	potato

The fourth section was seeded to opal wheat and clover on May 5th, at 135 kg wheat and 11 kg clover per hectare. Fertilizer rate was 350 kg 15-15-15 per hectare.

The fifth section was seeded with processing peas at a rate of 250 kg/ha. Fertilizer rate was 335 kg of 15-15-15 per hectare. 560 kg lime per hectare was applied before seeding. After harvesting of the peas, the same section was seeded to winter wheat on September 5th.

RESULTS AND DISCUSSION: The yield data and visual observation on soil erosion is recorded in Table II.

TABLE II. CROP YIELD AND VISUAL OBSERVATION OF SOIL EROSION.

Section (Treatment)	Yield (kg/ha) 1980 Potato	1981 Crop	Soil Erosion Visual Observation (Scale 1-10)
1 potato	254 kg/ha	26500	6
2 grain	254 kg/ha	3640	1
3 buckwheat	254 kg/ha	730	3
4 clover	254 kg/ha	2225	1
5 peas	254 kg/ha	1900	5

This trial will be continued until 1983 before any conclusion can be made.

THE EFFECT OF DEEP TILLAGE ON POTATO PRODUCTION ON COMPACTED SOIL

PROGRESS REPORT

BY

KAREL T. V. MICHALICA[1]

Abstract: Six varients of tillage technologies were compared with each other in terms of soil moisture content, tuber yield and its quality. There was no consistent pattern found in soil moisture content among the treatments. Higher yields and better tuber quality were found for the treatments which included deep tillage.

INTRODUCTION: Recently, potato producers have been reporting decreasing or stagnating potato yields per hectare despite of their intensified effort for optimization of fertility, plant protection and harvesting practices. It has been pointed out that degraded physical properties of many potato soils are the limiting factor in the strive for production increase.

Severely eroded soils with a shallow layer of loose soil over compacted subsoil can be found quite frequently being used for potato production in Carleton, Victoria and Madawaska Counties. These soils have limited capacity in supplying the crop with water, oxygen and nutrients.

The shallower is the loose topsoil and the lower is its organic matter content, the greater is the chance for a crop failure under stress conditions such as prolonged period of drought or excess of moisture or any significant deviation from the optimum cropping practices.

METHOD: Six combinations of tillage technology, namely chisel plowing and subsequent moldboard plowing, chisel plowing and subsequent vibra-shanking, moldboard plowing, followed by in-between-rows chisel plowing in summer, vibra-shanking followed by in-between-rows chisel plowing in summer, moldboard plowing only and lastly, vibra-shanking only. The spring plowing and vibra-shanking was done to the depth of 15 cm; the depth of chisel plowing ranged from 35 to 40 cm.

---

[1] Soil Surveyor, New Brunswick Department of Agriculture and Rural Development.

The field chosen for the study has the silty loam Holmsville soil and 4% southern slope. The depth of loose topsoil ranges from 20 to 30 cm.

The main deviation of 1981 weather from the "typical" one was the early and warmer spring, dryer than usual summer and mild, wet fall.

The same cultural practices, i.e. fertilization, plant protection, top killing and harvesting were followed on all treatments. Potato variety used in the study was Netted Gem.

Size of each treatment was 9 m (10 rows) by 80 m, the yield samples were collected from three 10 m long sections of randomly selected 1 row parcels.

RESULTS AND DISCUSSION: There were no significant differences in soil moisture content that would be consistent for any of the treatments. Soil moisture content (measured during prolonged dry and wet periods at the depth of 10 cm below soil surface for each treatment) is given in Table I.

Soil Moisture Content and Tuber Yield as
Effected by Various Tillage Technologies

Treatment*	% Moisture by Weight, Dry Period		% Moisture by Weight, Wet Period		Total Tuber Yield T/ha	No. 1 and oversize % of total Tuber Yield	Specific Gravity gm/cm^3
	Hill	Row	Hill	Row			
CH & V	15.6	14.4	27.9	29.4	47.7	77.6	1.0865
P & CH			24.2	31.6	46.6	75.0	1.0835
CH & P	15.6	14.4	27.5	27.7	46.0	73.1	1.0855
V	15.6	15.4	27.7	25.1	45.5	74.6	1.0855
V & CH			25.2	24.1	45.4	75.1	1.0850
P	15.8	13.9	27.5	26.6	44.6	74.5	1.0820

* CH - Chisel Plowing
V - Vibra - Shanking
P - Plowing

The tuber yield and specific gravity were determined as the average of three replicates is given in Table I.

The differences in tuber yield among treatments were small, the maximum being approximately 7%. However, there was quite large variations among replicates. This fact, possibly caused by a relatively large portion of misses among replicates, affected the results negatively.

There was, however, obvious trend in results showing that tillage treatments that included chisel plowing (especially those done before spring cultivation) out-yield the treatments where the traditional spring tillage technology was applied alone. Chisel plowing also positively affected the portion of No. 1 and oversized tubers from the total yield and increased the specific gravity as well.

RECOMMENDATIONS: The results of the study supported the expected fact, however, they were not conclusive. The study should continue for one or more years with the techniques of soil moisture measurement and yield data collection being altered.

ACKNOWLEDGEMENTS: The co-operation of Mr. Barrie Shaw, potato producer from Coldstream, Dr. Henry de Jong of Canada Agriculture, and their staff was greatly appreciated.

REFERENCES: G. R. Saini. Pedogenic and Induced Compaction in Agricultural Soils. Technical Bulletin 1. 1980.

POTATO LATE BLIGHT SPRAY FORECAST

BY

G. S. READ[1]

Abstract: A late blight potato spray forecast was provided for the potato industry in 1981 via two information sources. One, a detailed forecast with spray interval recommendations on a code-a-phone system;and a second general forecast issued through Environment Canada's Weatheradio, a continuous broadcast of weather information on VHF channels.

INTRODUCTION: A temperature and relative humidity monitoring network was set up at seven (7) locations throughout the potato belt. This information was sent to Agriculture Canada and a detailed blight forecast was prepared courtesy of W. A. Hodgson, Agriculture Canada. An advisory message was issued by A. Perley and B. Mulkewytch, Plant Pathology Staff of the Potato Division, New Brunswick Department of Agriculture, and recorded on a code-a-phone system. The potato blight index was issued to Environment Canada's Weatheradio through the cooperation of the Fredericton Weather Office.

The information was issued twice weekly, from July 7 through September 3.

RESULTS: The code-a-phone system received approximately 300 calls from July 7 to September 3. Due to a postal strike, there was a delay in informing growers of the availability of the system.

The blight index issued to Weatheradio was not on the air until the next day.

The numbers of growers receiving the forecast and subsequent application of the recommendations are difficult to measure. A follow-up questionnaire may be necessary to evaluate and improve the content and communication methods used.

The season was very conducive to blight with only two weeks of the nine weeks of forecasts recommending a ten-day spray interval with the remaining seven weeks on a seven-day schedule.

---

[1] Climatology Technician, New Brunswick Department of Agriculture and Rural Development.

CONCLUSIONS: A field trial implementing the spray schedule recommended by the forecast should be set up to evaluate the dollar savings possible with fewer and more timely sprays. These economic benefits of reduced chemical applications would be particularly significant in a dry year.

Some difficulties arose in maintaining an up-to-date forecast. Hopefully, a system will be developed that can be updated more often.

ACKNOWLEDGEMENT: A thank you is in order for the summer student field crews who maintained the climate stations necessary to implement this program.

TOMATO YIELD RESPONSE (UNDER PLASTIC MULCH) TO NITROGEN FERTILIZER AND TRANSPLANTING DATE

BY

R. CORMIER, I. GHANEM, E. BERNARD AND R. BUCHANAN[1]

Abstract: The use of plastic mulch in vegetable production has been introduced to New Brunswick in the last three years. Evaluation of tomato yield response to three rates of nitrogen application 56, 78, 101 kg N/ha was conducted at two dates of transplanting. The yield data indicate that 56-78 kg N/ha was adequate for tomato grown under plastic mulch. The highest yield differences between plastic mulch and no mulch were obtained with the earlier transplanting date.

INTRODUCTION: Previous studies on the use of plastic mulch in vegetable production have indicated that plastic would reduce the leaching of soluble nutrients added as fertilizer. Thus, these nutrients stay in the available form for a longer part of the growing season. It is of importance to find out the optimum rate of application of nitrogen fertilizer under plastic mulch. The lower rate of fertilizer would affect the cost of production under plastic mulch.

MATERIAL AND METHODS: The trial was carried out on a silty loam soil interval land at Maugerville-Sheffield area. The soil had a pH of 6.9 with a high rating for phosphorus and a medium rating for potassium, calcium and magnesium. Super-phosphate and muriate of potash were broadcasted at the rate of 150 kg P_2O_5 or K_2O per hectare. The treatment of nitrogen application rate was applied to the treatment rows. Three rates of nitrogen application were compared and the rates were 56, 78 and 101 kg N/ha. The soil was then tilled to incorporate the fertilizer - one half of the trial was mulched with black plastic and the other half was left unmulched.

Each treatment was replicated three times and the effect of the three rates of nitrogen was evaluated at two different transplanting dates, June 3rd and June 10th. The transplants were eight weeks old and the variety was Scatia. A starter solution 10-52-17 was applied to the young transplants prior to transplanting at a rate of 0.16 gm/plant.

---

[1] Vegetable Specialist; Soil Specialist; Agricultural Technicians respectively. New Brunswick Department of Agriculture and Rural Development.

Plants were spaced 0.6 meters in the row and 1.6 meters between rows. Plants were protected against diseases with a recommended fungicide spray program.

Soil and tissue samples were collected at two different dates that is July 10th and July 28th during the growing season to monitor the level of nutrients in both soil and plant tissue.

Tomato harvest started on August 4, 1981 (first pick), and continued to September 22nd (final pick). The harvest was graded, counted and weighed.

RESULTS AND DISCUSSION: Yield data of all the treatments are shown in Table I. Under mulch, the highest yield was obtained at 56 Kg N/ha and a reduction in yield was obtained at the higher rates. This indicates that 56 Kg N/ha is the optimum rate of nitrogen application under plastic mulch when transplanting is done as early as June 3rd.

Under no mulch, the yield increased from 25 to 28 kg of Canada No. 1 as the rate of nitrogen increased from 56 to 78 kg of N/ha. However, the yield declined to 23 kg when the rate of nitrogen increased to 101 kg N/ha. The slight decrease in yield could be due to excess nitrogen leading to more vegetative growth and less and later fruiting.

At the June 10th transplanting under no mulch, there was little difference in yield between the three rates of applied nitrogen. This would indicate that at later transplanting date less nitrogen is required to obtain optimum yield because of the shorter growing season. Under mulch, there was slight increase in yield with the increase in the rate of nitrogen application.

There is, on the average, 60% increase in yield due to the use of plastic mulch at June 2nd transplanting. However, there is only an average of 30% increase in yield due to the use of plastic mulch at the June 10th date of transplanting.

CONCLUSION: 56-78 Kg N/ha is an adequate rate of nitrogen application for tomato under plastic mulch - while 78 Kg N/ha is considered adequate for non-mulched tomatoes. To take full advantage of plastic mulch increasing effect on tomato yields, earlier date of transplanting is recommended. This trial needs to be repeated next year to validate this year's findings and also extended to cover other crops grown under plastic mulch.

TABLE I

TREATMENTS	YIELD KG FOR TEN PLANTS August 24 Picking		YIELD KG FOR TEN PLANTS September 17 Picking	
	Canada No. #1 (kg)	Seconds (kg)	Canada No. #1 (kg)	Seconds (kg)
No Mulch (Transplanted June 3)				
56 - Kg N/ha	4.5	2.8	25.1	31.6
78 - Kg N/ha	5.8	3.0	28.2	28.9
101 - Kg N/ha	6.1	2.0	22.9	24.2
Mulch (Transplanted June 3)				
56 - Kg N/ha	7.7	3.1	42.9	32.2
78 - Kg N/ha	5.4	1.7	39.2	33.7
101 - Kg N/ha	4.7	1.9	38.7	35.6
No Mulch (Transplanted June 10)				
56 - Kg N/ha	4.0	1.2	19.3	12.1
78 - Kg N/ha	3.2	0.9	18.8	10.4
101 - Kg N/ha	3.2	1.0	20.0	12.2
Mulch (Transplanted June 10)				
56 - Kg N/ha	3.1	1.3	22.9	13.9
78 - Kg N/ha	2.7	0.9	25.3	14.5
101 - Kg N/ha	4.1	0.9	27.2	19.1

USE OF FLOATING MULCH ON VEGETABLE CROPS

PROGRESS REPORT

BY

RENALD CORMIER, EMERY BERNARD, CLARA LEBLANC[1]

Abstract: Evaluation trials on the use of two (2) types of floating mulches were carried out at three (3) different locations in 1981. The results show a greater difference in harvest dates between floating mulches and bare soil with earlier transplanting.

INTRODUCTION: The use of floating mulch for vegetables is being used more and more by growers in different countries of Europe. Perforated floating mulches have the ability to produce earlier crops. Results from work in Europe indicate that floating mulches can advance maturity by as much as one (1) to three (3) weeks depending on the vegetables that are grown using this system. With these floating mulches, the plastic film "floats" on top of the crop foliage and in some way resembles a low plastic tunnel, but without the need of supporting steel wire hoops. It was felt among growers that this technique could be advantageous to our Maritime climate.

Trials were carried at three (3) different locations in New Brunswick: Mr. Laurie LeBlanc in Cap Pele with lettuce and cabbage; at Mr. Frank Cleven in Sheffield with cabbage and cauliflower and at Harrison Farms in Maugerville with lettuce.

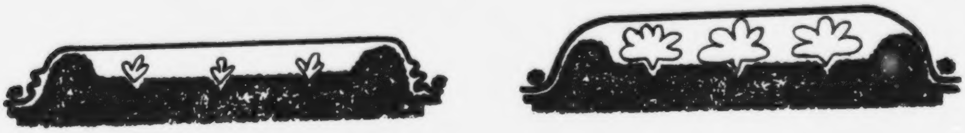
MATERIAL AND METHODS: The two (2) types of floating mulches used were A.S.B. - growing foil, supplied by A.S.B. (Canada) Ltd., Pointe Sapin, Kent County, N.B., and Xiro slit film, supplied by White Tomb Finlay Ltd., Toronto, Ontario. The A.S.B. - growing foil is a light green colored plastic 1.5 meter wide and 2 mil. thick with holes one (1) centimeter in diameter at every 2.5 centimeters. The Xiro slit film is a netted clear plastic 1.6 meter wide and 1.5 mil. thick.

---

[1] Respectively Vegetable Specialist and Vegetable Technician, Plant Industry Branch, and Horticultural Technician, Extension Branch, N.B. Department of Agriculture.

The floating mulches were laid according to specifications from the suppliers. The film is laid directly over the transplants. The Xiro film was laid loosely in the length to allow for expansion with the growing plants. Film will stretch as the plants grow permitting the slits to open thus creating progressive ventilation and less heat build-up. The A.S.B. film has no elastic properties, therefore it had to be laid loosely in the width usually by folding the plastic at the edges at ground level to allow for plant growth. Also ridges were made on the edges to elevate the plastic above the young transplants. This is more important when using A.S.B. foil (see diagram)

Diagram showing method of application:



Before transplanting, the cabbage and cauliflower sections were sprayed for weed control with Dacthal W-74 and the lettuce sections with Chlorpropham, CIPC, both at the recommended rates.

OBSERVATIONS: Because of its elastic properties, the Xiro slit film expands with the crops seemingly without affecting growth. These tiny slits are closed when the film is layed and opens progressively as the plants grow. Therefore plants benefit from heat early in the season and the gradual opening of the slits allows plants to adapt to the outside climate as the season advances.

The A.S.B. - growing foil has no system of elasticity, therefore care must be taken to leave a fold at the secured edges to permit expansion of the plastic with the growing crop. If this is not done correctly, the film must be loosened manually during the growing season. If the film does not expand freely, the plants of the outer row are susceptable to curling due to lack of growing space.

Neither type of mulch caused problems during rainfalls or windy days. However, the A.S.B. - growing foil has more plastic area on a given surface which results in more condensation and more mulch effect. This condensation could be beneficial with regard to frost protection. Condensation under the film did not affect cabbage and cauliflower. However, some breakdown appeared with lettuce a few days prior to film removal. This possibly could have been prevented if the floating mulch was removed sooner.

Experiments carried out in Europe show that there is an optimum time of removal for floating mulches before which the full advantage has not been accumulated and after which yields can decline below those of unmulched crops. For these trials plastic was removed five (5) weeks after application. Removal should take place in the evening of a cloudy day.

With earlier transplanting lettuce was harvested ten (10) days sooner with the A.S.B. - growing foil and seven (7) days with the Xiro slit film over the control. Where transplanting was done early the majority of the cabbage was harvested eight (8) days sooner under both films as compared to the unmulched area. No significant difference was observed with cauliflower transplanted at normal date. Researchers do not attribute earlier maturity to high temperatures but rather to the carbon dioxide supply and radiation level at the plant leaf.

Weed control was good with no apparent plant damage due to herbicides.

The A.S.B. - growing foil is available locally. The Xiro film is available from Ontario and also have a company representative in the province of Quebec.

CONCLUSIONS: Floating mulches performed best when earlier transplanting was possible. Transplanting at normal dates for the area showed no significant advantage in maturity. The A.S.B. growing foil showed a slight edge in maturity over the Xiro slit film.

Some concerns, however, when using these floating mulches are the versatility of transplanting equipment to transplant in a trench and at close row spacings. Growers using this technique would have to purchase another type of mulch layer. There exists some

European machines that can lay this type of film. Another concern is the effect of excess moisture to transplants grown using this technique, especially lettuce.

RECOMMENDATION: Additional trials will be carried out in 1982 to further evaluate this new technique.

WEED CONTROL FOR VEGETABLES GROWN WITH PLASTIC MULCH[1]

PROGRESS REPORT

BY

D. J. DOOHAN, R. C. CORMIER, E. BERNARD[2]

Abstract: Herbicides were evaluated for weed control on sweet corn, snap beans, cucumbers and squash, direct seeded in a trench under clear plastic mulch; tomato, cucumber and muskmelon under row tunnels. Rope-wick applicators were designed, constructed and evaluated to control weeds between rows of black plastic mulch.

INTRODUCTION: The increasing use of plastic mulch, for vegetable production in New Brunswick has resulted in 3 questions concerning weed control with this new technology;

1) what herbicides to use under the clear plastic,
2) what rate of herbicide to apply,
3) how to control weeds between rows of black plastic.

The herbicide to be used must first of all be registered for the crop in question and must be applied within the range of registered rates. There has been a great deal of uncertainty concerning the rate of herbicide; should it be lower, higher, or the same rate as would normally be applied to unmulched soil.

Finally in several of the transplanted crops, growers had found black plastic to improve earliness, crop quality and yield, and provide total weed control within the row. However it was difficult to control weeds in the inter-row. Cultivation tended to disturb the black plastic and directed post-emergence spraying was very dangerous to the crop.

The following experiments were initiated to study these problems with the goal of eventually formulating a comprehensive weed control program for vegetables grown with this technology.

---

[1] Financially supported by the Technology Transfer Program.

[2] Weed Specialist, Vegetable Specialist, Vegetable Technician respectively, N.B Dept. of Agriculture and Rural Development.

MATERIALS AND METHODS:

The experiments were set out during May, June and July 1981.

Experimental plots were a randomized block design with 3 replications. Each replication consisted of a 5 m row. A"V" shaped trench was made and the plastic was laid with a tractor mounted mulch layer.

Herbicides were applied with a precision plot sprayer. All rates listed are active ingredient (a.i.). Preplant incorporated (ppi) treatments were sprayed before seeding and tilled in with a garden tiller prior to trenching and planting operations. Preemergence (pre) treatments were applied immediately after seeding but before crop emergence. Post-emergence (post) treatments were applied after crop emergence or transplanting.

Visual observations on weed control and crop tolerance were made throughout the season and are on a percentage weed control and crop injury basis. Yields reported are in kg/plot.

RESULTS AND DISCUSSION:

Snap bean Trial

TABLE 1.

WEED CONTROL IN SNAPBEANS GROWN IN A TRENCH UNDER PLASTIC MULCH

TREATMENTS	Kg/Ha	TIME	CULTURE	YIELD Kg/PLOT		BROADLEAF Weed Control
				Early Butterwax	Contender	
Afesin	1.50	Pre	No mulch	7.3	7.3	98
Afesin	1.50	Pre	Mulch	7.4	7.1	100
Afesin	0.75	Pre	Mulch	8.8	10.9	95
No Herbicide			Mulch	No Harvestable Yield		33
Treflan + Afesin	0.90 0.90	ppi Pre	No mulch	6.3	9.7	98
Treflan + Afesin	0.90 0.90	ppi Pre	Mulch	7.1	7.8	98
Treflan + Afesin	0.60 0.60	ppi Pre	Mulch	7.4	9.1	100
No Herbicide			Mulch	No Harvestable Yield		10

There were no apparent differences in herbicide activity between mulched and unmulched plots of the same treatment. There is indication that the lower rates of Afesin may have been less injurious to the crop than the 1.50 kg/ha rate. The yield advantage of plastic mulch was not gained on this trial due to late planting.

In addition, 3 unreplicated plots consisting of a single row of snap beans under plastic were set out. Treatments were;

Preemerge	3.0 kg/ha pre
Eptam	3.00 kg/ha ppi
Eptam	3.00 kg/ha plus Amiben 2.25 kg/ha ppi

Of these the Eptam plus Amiben plot was superior.

Corn Trial

Due to considerable variation in the soil within this experiment, the results were difficult to interpret. Treatments consisted of tank-mixes of atrazine plus Lasso and Bladex alone. Each treatment was tested within the registered range of rates under plastic and on bare ground. There were no apparent differences in herbicide activity between mulched and unmulched plots. Weed control was better with preemergence atrazine and Lasso than with preplant incorporated atrazine and Lasso. This was likely due to the bottom of the trench being deeper than the incorporation (15 cm versus 10 cm). Most of the weeds were growing from the bottom of the trench. The bottom of the preemergence treated trenches were thoroughly sprayed. A rate of 2.25 kg/ha Lasso was required to adequatly control annual grass when applied preemergence. Bladex gave good control of annual grass and broadleaf weeds. No serious crop injury was observed with any of the treatments.

Direct Seeded Cucumbers Under Plastic Mulch

Dyanap at 5.5 kg/ha under plastic mulch gave excellent control of broadleaf weeds and annual grasses. The same treatment on bare soil did not provide satisfactory control. Lower rates of Dyanap (4.5 and 3.5 kg/ha) give good control of broadleaf weeds but not annual grasses.

Several rates of Prefar plus Alanap preplant incorporated were tested at rates of 3.5 kg/ha to 5.5 kg/ha. Weed control was not adequate.

Crop injury was observed on all the plots. This may have been partly due to water lying in the trenches for several days prior to crop emergence as well as actual herbicide effects.

Control with Dyanap persisted for about 4 weeks.

Direct Seeded Squash Under Plastic Mulch

Treatments were Alanap at 3.5, 4.5 and 5.5 kg/ha preemergence and Amiben at 1.0, 2.0 and 3.0 kg/ha preemergence. Both herbidices gave better control on bare soil when compared to mulched soil. Only Alanap 5.5 kg/ha gave adequate control on mulched soil.

Crop injury was observed on all plots. As in the direct seeded cucumber trial injury may have been partly due to water lying in the trench for several days.

Control with Alanap persisted for about 2-3 weeks.

Table 2

Weed Control in Cucumbers Under Row Tunnels

TABLE 2.

WEED CONTROL IN CUCUMBERS UNDER ROW TUNNELS

TREATMENTS	Kg/Ha a.i.	TIME	CULTURE	CROP YIELD kg/Plot	CROP INJURY	% CONTROL BARNYARD GRASS	% CONTROL BROADLEAF WEEDS
Alanap	5.5	Post	No tunnel	0.7	62	67	62
Alanap	5.5	Post	tunnel	17.6	25	85	67
Alanap	3.5	Post	tunnel	7.7	35	50	73
No Herbicide			tunnel	10.8	25	30	20
Prefar	5.5	ppi	No tunnel	0.1	58	100	22
Prefar	5.5	ppi	tunnel	4.1	30	67	20
Prefar + Alanap	5.5 5.5	ppi Post	No tunnel	0.3	57	83	68
Prefar + Alanap	5.5 5.5	ppi post	tunnel	47.2	13	93	85
Black Plastic			tunnel	35.8	0	100	100

There was an indication of enhanced activity of Alanap under the tunnel when compared to Alanap applied to bare soil. Crop tolerance did not seem to be affected. Control with Alanap alone appeared to break down after about 2 weeks. The combination of Alanap 5.5 kg/ha ppi plus Prefar 5.5 kg/ha post gave the best results and the control was longer lasting and included both broadleaf weeds and barnyard grass (BYG). Smartweed and ladiesthumb were the predominant broadleaf weeds (BLW).

Table 3

Weed Control In Tomatoes Under Row Tunnels

TABLE 3.

WEED CONTROL IN TOMATOES UNDER ROW TUNNELS

TREATMENTS	RATE kg/ha	TIME	CULTURE	VIGOR	kg/PLOT YIELD	%GENERAL WEED CONTROL
Treflan	1.1	ppi	N.T.	40	39.8	68
Treflan	1.1	ppi	T.	22	43.1	68
Treflan	0.8	ppi	T.	20	28.5	43
Treflan	0.4	ppi	T.	28	29.1	7
No Herbicide			T.	28	8.8	10
Treflan + Enide	1.1 5.5	ppi post	N.T.	35	39.0	95
Treflan + Enide	1.1 5.5	ppi post	T.	25	40.9	97
Treflan + Enide	0.8 4.0	ppi post	T.	18	48.1	97
Enide	4.0	post	T.	15	46.2	83
Enide	5.0	post	T.	18	58.7	85
Enide	6.0	post	N.T.	35	55.5	92
Enide	6.0	post	T	18	30.3	85
Black Plastic			T	10	31.3	87

N.T.- No tunnel, T.- Tunnel

The highest yields were obtained with the sprays of Enide postemergence. Weed control was better with the Treflan/Enide combination, however, crop injury was greater resulting in a lower yield. Crop injury was observed on all plots treated with Treflan.

Vine growth was more vigorous on plots with black plastic, but maturity was delayed.

Table 4

Weed Control In Muskmelons Under Row Tunnels

TABLE 4.

WEED CONTROL IN MUSKMELONS UNDER ROW TUNNELS

TREATMENT	Kg/Ha a.i.	TIME	CULTURE	CROP INJURY	% CONTROL BARNYARD GRASS	BROADLEAF WEEDS
Alanap	5.5	Post	No tunnel	65	50	68
Alanap	5.5	Post	Tunnel	8	57	93
Alanap	4.5	Post	Tunnel	10	0	80
Alanap	3.5	Post	Tunnel	13	0	73
No Herbicide			Tunnel	13	0	0

The activity of Alanap was again enhanced under the tunnel as compared to bare soil. The injury rating of 65% for Alanap 5.5 kg/ha with no tunnel was more the result of transplants being fully exposed at transplanting rather than the effect of the herbicide. An accepable yield was obtained with the three rates of Alanap under row tunnels. Alanap does not give good control of annual grass.

CONCLUSIONS: Recommended herbicides were tested under plastic mulch and row tunnels on the following crops. Conclusions should be considered tentative pending further results.

Snap beans

The lower recommended rates of Afesin 0.75 kg/ha gave good weed control and high yield. The tank-mix of Eptam plus Amiben preplant incorporated was very safe and effective.

Sweet Corn

No differences in herbicide activity were observed between mulched and unmulched treatments. Preplant incorporated treatments should be avoided unless they are to be followed by a preemergence spray since the recommended depth of herbicide incorporation is insufficient to give good control at the bottom of the trench.

Direct Seeded Cucumbers

Dyanap gave good control under plastic mulch but not on bare soil. When annual grasses were present the 5.5 kg/ha rate gave better control. Crop injury was observed.

Direct Seeded Squash

Alanap and Amiben both gave better performance on bare soil than on mulched soil. Only the high rate, 5.5 kg/ha of Alanap, gave good control on mulched soil. On all other trials when Alanap (or Dyanap, which contains the same a.i.) was used, it performed best under plastic. Crop injury was observed.

Cucumbers Under Row Tunnels

The combination of Alanap preplant incorporated plus Prefar postemergence gave the best weed control of both broadleaf weeds and annual grass.

Tomatoes Under Row Tunnels

Enide postemergence gave the highest yield and good weed control. Maturity was delayed on black plastic and the marketable yield was lower.

Muskmelons Under Row Tunnels

Alanap performed best under the row tunnel. Good control of broadleaf weeds was obtained with rates of 3.5 to 5.5 kg/ha. The 5.5 kg/ha rate gave some control of barnyard grass.

Weed Control Between Rows of Black Plastic Mulch

Several rope-wick type applicators were built and tested. The type that worked best consisted of a section of 10 cm ABS pipe, capped at both ends (length would depend on row width), with a filler plug in the center. Two rows of holes were drilled 4 cm apart, each row offset from the other. Sections of nylon marine rope were cut in 30 cm lenghts, one end taped and inserted 1/3 in the pipe and sealed in the pipe with ABS cement. The exposed rope was taped in the middle and the end of the rope unravelled to increase the surface area for wicking herbicide onto weeds.

Such a system could be mechanized, perhaps in multiple units.

This type of wiper effectively controlled about 80% of the weeds between the rows of black plastic. A 20% solution of Roundup in water was the usual herbicide. It was difficult to control the weeds growing from the bottom of ridges and furrows within the inter-row and at the margin of plastic and soil.

Another system that has worked quite well for growers consists of applying a herbicide registered for the crop to the field after the plastic has been laid, but before transplanting. The plastic gives season long weed control within the row and the herbicide gives several weeks of control in the inter-row.

ACKNOWLEDGEMENTS: The assistance of Karl and Gordon Harvey of Maugerville was greatfully appreciated. Their supply of plant material, practical experience, and ideas was indispensable.

PLASTIC TUNNEL MICROCLIMATE

BY

P. J. SMITH AND G. S. READ[1]

Abstract: The microclimates of plastic tunnels and tents was measured to assess the amount of frost protection and the ventilation design of the tunnel under various treatments. The degree of frost protection was variable and depended upon the existing atmospheric conditions. Methods of reducing labour for ventilation were effective, but also reduced frost protection.

INTRODUCTION: The use of plastic in vegetable production is rapidly increasing in New Brunswick. The earlier maturity and higher yields reported are due primarily to a more favorable microclimate created by the plastic. In general, plastic is credited with causing higher air and soil temperatures, conserving soil moisture, controlling weeds and providing some measure of frost protection.

However, there are several potential problems related to the climate created by plastic tunnels, specifically:

1. Excessively high temperatures on sunny days which presently require manual labour to open the tunnels on such days;

2. Little or no frost protection under certain weather conditions;

A project was devised to study the significance of these and other related problems, hopefully leading to workable solutions.

METHODOLOGY: The plastic tunnels under study were 15 feet in length and approximately 20 inches in height. The modifications to these tunnels in measuring frost protection and self-ventilation are described in column one of Table I. In each tunnel, soil temperatures (5 cm depth) and air temperatures (10 cm above soil) were measured at ten (10) minute intervals for a twenty-four (24) day period. At the same time, outside air temperatures were determined and data on wind speed, radiation, sunshine and precipitation was available from the agrometerology station (C.D.A. Fredericton) immediately adjacent to the test site.

---

[1] Agrometeorologist and Climatological Technician, respectively, New Brunswick Department of Agriculture and Rural Development.

Tomatoes (cv. Scotia) were planted in the tunnels to provide more representative tunnel temperature data.

RESULTS: Maximum and minimum air temperatures, averaged over the 24-day period, are listed in Table I for each type of tunnel. The lower half of the table presents the difference in average air temperature between the tunnel and the outside air.

TABLE I

VARIABLE	MEAN MAXIMUM	MEAN MINIMUM
T_{AIR}	17.7	4.8
TEST 1 (NORTH-SOUTH)	31.7	5.3
TEST 2 (EAST-WEST)	33.4	5.1
SLITS (SIDES)	33.8	5.7
HOLES (SIDES)	29.5	4.9
BARE (SOIL)	35.6	6.4
PLASTIC (BLACK)	44.3	5.3
MANURE	33.2	5.1
PEAT (SOIL)	35.2	4.7
SLIT 2 (TOP & SIDES)	31.2	4.8
HOLE 2 (TOP & SIDES)	26.3	4.8
*DOUBLE	38.2	7.1
TENT	36.1	6.7
DIF 1 (TEST 1-T_{air})	14.0	.5
DIF 2 (TEST 2-T_{air})	15.7	.3
DIF 3 (SLITES-T_{air})	16.1	.9
DIF 4 (HOLES-T_{air})	11.7	.1
DIF 5 (BARE-T_{air})	17.9	1.6
DIF 6 (PLASTIC-T_{air})	26.6	.5
DIF 7 (MANURE-T_{air})	15.5	.2
DIF 8 (PEAT-T_{air})	17.4	- .1
DIF 9 (SLIT 2-T_{air})	13.5	.0
DIF 10 (HOLE 2-T_{air})	8.6	- .1
*DIF 11 (DOUBLE-T_{air})	20.6	2.3
DIF 12 (TENT-T_{air})	18.4	1.8

*Adjusted temperature based on 8 days data.

As expected, increased ventilation procedures result in reduced daytime highs but also reduce frost protection. In fact, the average minimum temperature over twenty four (24) days was colder in two of the tunnels (peat soil amendment and the tunnel with holes in top and sides) than the outside minimum air temperature. It is also important to observe that these relative relationships between tunnels are not always consistent and depend to a large extent upon the preceding atmospheric conditions, soil type and moisture, and plant size. Strong radiative heating from the previous day may provide enough heat in the soil to give some measure of frost protection. However, if the previous day was cloudy, the same tunnel would likely provide minimal frost protection or could even give rise to temperatures cooler than the outside air.

The double walled tunnel provided, on average, 2.3°C* higher minimums than outside and the tent provided an average frost protection of 1.8°C. On specific occasions, as much as 3.6°C protection was provided, however, on one occasion, the tent was actually 1.9°C colder than outside air temperature.

The orientation of ventilated tunnels to the prevailing wind direction was important in reducing daytime maximum temperatures (see Table I). More cooling was observed when the wind blew against the side of a tunnel than when it blew along its length.

The highest daytime temperatures were experienced in the tunnel over black plastic with an average maximum of 44.3°C which is 26.6°C warmer than outside air temperature. If we equate this difference in terms of growing degree days greater than 5°C, we find that the tunnel over black plastic accumulated 475 degree days over the 24 day period, while outside the tunnel only 150 degree days were accumulated. Undoubtedly, this fact helps explain the rapid growth evidenced under plastic tunnels.
On the other hand, there are several (8 out of 24) days when the maximum daily air temperature under the black plastic tunnel exceeded 50°C, possibly a lethal temperature for some crops. Comparing these extremes with a tunnel over bare soil, the bare soil treatment was 10°C cooler.

CONCLUSIONS: In generalizing conclusions about these tunnel treatments, a grower must take into consideration that some factors, i.e. soil type and moisture may change the effectiveness of these treatments on daytime highs and nighttime lows. Results are dependent to a great extent on the amount of cloud cover and windspeed from the previous 24 hours. However, with these limitations identified, a relative comparison of the various types of tunnels can be given.

All tunnels increase the amount of heat the crop will receive, hence contributing to rapid plant growth. The actual amount of heat obtained depends upon weather conditions, soil factors and tunnel design. Frost protection is very minimal in most treatments and varies according to atmospheric and soil conditions. The addition of any ventilation ports reduces the level of frost protection that can be expected, and therefore such modifications are not recommended before spring frost risk is low. Some tunnel configurations may induce high temperatures that are lethal to certain crops.

Tunnels should be oriented to face the prevailing winds, if the sides are to be perforated or raised for cooling purposes.

In summary, based upon the information we have collected, single walled polyethelene tunnels provide increased heat. They give minimal frost protection. In order to reduce the risk of frost damage under plastic, sensitive crops should be planted when the risk of killing frost is low. The effect of planting later, after frost risk is minimal may be more than offset by the rapid growth resulting in earlier maturity under plastic. Through future work, it may be possible to regulate the maturity date of crops grown under plastic, through manipulating ventilation characteristics of tunnels. This would allow the producer to control the rate of heat unit accumulation and hence provide a more orderly harvest. To moderate high daytime temperatures without excessive labour costs, permanent ventilation perforations can be cut into the tunnel material but it is recommended that this be done only after the danger of spring frost is past.

DEMONSTRATION OF PRECISION SEEDERS AND EVALUATION OF GEL SEEDERS FOR VEGETABLES

BY

CHARLES EVERETT AND RENALD CORMIER[1]

Abstract: On-farm demonstrations of precision vegetable seeders were successfully carried out at several locations in New Brunswick with many vegetable crops. Work was also done on evaluating the performance of the Nibex seeder with larger size seeds. Also, two hand operated gel seeders were evaluated with Brussels sprouts and carrots with encouraging results.

INTRODUCTION: The previous two years of the project were spent on evaluating five (5) different types of vegetable precision seeders. On completion of this project, it was felt that these seeders should be demonstrated to producers throughout the province. So this year, on-farm demonstrations were carried out with precision seeders on several vegetable crops in Kent, York and Sunbury counties and also in P.E.I. On request by producers, a spacing trial was conducted with the Nibex seeder on beans and sweet corn to determine if it could precision seed larger size vegetable seeds. This trial was conducted at the Hoyt Horticultural Centre. Because of the ever increasing problem encountered with poor seed germination with certain vegetables caused by factors such as climatic conditions and soil crusting, producers are becoming more and more interested in the concept of gel seeding (fluid drilling). Gel seeding is basically sowing pre-germinated seeds suspended in a gel. This concept of sowing pre-germinated seed is an alternative to solving some of the problems associated with seedling emergence. Experimental work on vegetable crops has shown that gel sowing of pre-germinated seeds in comparison with traditional sowing methods using dry seeds gives earlier and, in most species, higher and more predictable seedling emergence. This sowing method is being used commercially in many European countries, States in U.S.A. and Ontario.

MATERIALS AND METHODS: Only the Nibex and Stanhay were used for on-farm demonstrations.

Gel seeding was evaluated with Brussels sprouts in Rogersville, Kent County, and carrots in Sheffield,

---

[1] Respectively, Agricultural Engineer and Vegetable Specialist, New Brunswick Department of Agriculture and Rural Development.

Sunbury County, using the Flowsow seeder from England and the F.P. 500 seeder obtained from the Nova Scotia Agricultural College.

Seeds were pre-germinated in a germinator furnished by Fluid Drill Incorporated from England. The seeds were emersed in 21°C water with air bubbles for aeration and agitation. The Brussels sprout seeds were left in the germinator for 1 1/2 days and the carrots for 3 days. After this soaking period, about one-half of the seeds showed a small radicle. These seeds were then mixed in a gel furnished by Fluid Drill Inc.

RESULTS AND DISCUSSION: Because of the preference shown by producers, only the Nibex and Stanhay precision seeders were used for on-farm demonstrations. These two seeders were used because the belt and cup feeding system were preferred by growers to the selector wheel and vacuum type seeders and also because of the ease of changing the seed metering mechanism to obtain various spacing for different crops.

Similar to the results obtained in the previous two years with Brussels sprouts in the Rogersville area, a poor emergence was again obtained. The same problem was not experienced with cabbage and rutabagas. Brussels sprout seeds would seem to be more susceptible to certain growing conditions. Brussels sprout growers at the seeder demonstration were inclined to attribute the poor emergence to the seeding depth.

On-farm demonstrations were well appreciated by producers. In general, producers were satisfied with the seeders performances.

The Nibex seeder did not perform well with the large bean and corn seed. The co-efficients of variation were very high with the number of plants being two (2) to three (3) times higher than desired. The Nibex seeder did, however, perform better with bean than corn seeds. The Nibex seeder was not originally designed to sow large seeds and the Company did not recommend its use for large seeds. But, because it performed well with smaller seeds in the previous two years of evaluation, producers wanted to see how it would perform with larger seeds.

The gel seeders used were only to evaluate the basic concept of fluid drilling which is to obtain a faster emergence, increased emergence and more uniform growth. These seeders were not designed to achieve precision placement as shown by the high co-efficient of variation indicated by the inconsistency in plant spacing.

There are some commercially mounted tractor units that have more precision for certain vegetable crops. Spacing was controlled by the amount of seeds mixed in a predetermined amount of gel. This mixture of the powder and water must be exact to obtain proper viscocity of the gel in order to keep the seeds in suspension. Carrots and Brussels sprouts emerged three (3) days sooner using the gel seeding technique. There was no significant difference in the number of Brussels sprout plants that germinated between the two (2) gel seeders used. However, the number of Brussels sprout plants was significantly higher using the gel system over the traditional dry seed with the Nibex and Stanhay seeders. These seeders are better adapted to single row seeded crops like Brussels sprouts, cabbage, etc., rather than carrots where banding is preferred. There wasn't any greater forking or mishapen carrots using the gel system.

During the year, seven (7) grower meetings were held in New Brunswick where the results of precision vegetable seeding trials were presented and discussed. Also, presentations were made at a cole crops short course at the Agricultural College in Truro and at the annual meeting of the Nova Scotia Vegetable Producers Association.

CONCLUSION AND RECOMMENDATIONS: The three (3) year evaluation of precision vegetable seeders under the technology transfer program can be termed as quite successful. Growers from New Brunswick, as well as those from Prince Edward Island and Nova Scotia, benefited from these evaluations. The New Brunswick Department of Agriculture is now in a much better position to advise growers as to which seeder would better suit their particular operation.

Additional field trials should be carried out to further investigate the possibility of precision field seeding of Brussels sprouts. The results from this first year of work with gel seeding were promising and have good potential. Emergence was advanced by three (3) days for both carrots and Brussels sprouts and the percent emergence was also increased over the dry seed sowing technique. Because of the particular seeders used, precision seeding was not obtained. Because of the interest shown by the growers, more indepth field evaluations of gel seeding should be carried out in 1982.

NO TILLAGE TECHNOLOGY FOR VEGETABLE CROPS TO MINIMIZE SOIL EROSION[1]

PROGRESS REPORT

BY

RENALD CORMIER, EMERY BERNARD, KAREL MICHALIKA,
DOUGLAS DOOHAN[2] AND DAVID MCKINNEY[3]

Abstract: A trial was initiated in the Maugerville-Sheffield area to evaluate and demonstrate the possibility of vegetable production under no-tillage or minimum tillage methods to reduce the serious problems of soil erosion which is destroying the farms in the area. Plots were seeded down with different cover crops in August of 1981 and vegetables will be grown for the first time in 1982.

INTRODUCTION: There exists in the Maugerville-Sheffield area a severe problem of soil erosion on vegetable producers' fields during the spring run-off of the Saint John River as there is no protective vegetation at this time of year on fields used for horticultural crops. Some fields have been eroded so severely that they had to be abandoned while others have been damaged to the degree that production has been affected and production cost increased due to loss of nutrients. Expansion of vegetable production in the area is limited unless a solution can be found to alleviate the erosion problem.

A trial was therefore initiated in 1981 on David McKinney's farm in Maugerville to evaluate and demonstrate the feasibility of using no-tillage and minimum tillage technology for vegetable production.

---

[1] Financially supported by Technology Transfer Program, A.S.A. II.

[2] Respectively Vegetable Specialist, Vegetable Technician, Soil Surveyor and Weed Specialist, Plant Industry Branch, N.B. Department of Agriculture and Rural Development.

[3] Vegetable Producer, Maugerville, N.B.

MATERIAL AND METHODS: Before proceeding with the trial, the field had to be graded and levelled to fill the eroded areas caused by the last flood. Soil samples taken in 1981 showed a pH of 5.7 to 6.0 and medium phosphorus, very high potash, medium calcium and low magnesium reading. Dolomitic limestone was applied to correct the low magnesium level and soil acidity.

Cover crops used in the experiment were sod, winter rye and red clover. (An area with no cover crop was left as a check plot.) Red clover was seeded on August 24th and again cross-seeded on August 28th at identical rates of 16 kilograms per hectare. The sod area was seeded with a mixture containing 40% Kentucky Blue, 40% Creeping Fescue and 20% annual Ryegrass at rate of 18 kilograms per hectare (on August 28). Winter rye at rate of 200 kg per hectare was also seeded down August 28. Fertilizer used was 5-20-20 at rate of 450 kilograms per hectare for all cover crops. Crops to be experimented with in 1982 are sweet corn, broccoli, snap beans and tomatoes.

RESULTS AND CONCLUSION: This is the establishment year for this trial. Vegetable performance will be determined in 1982. Cover crops were seeded late, especially the red clover. Observations taken at the end of October showed excellent growth for winter rye and fair growth for sod. Red clover germinated well, but growth was not as advanced as it should have been. Further observations on cover crops will be taken in the spring of 1982.

SCREENING HERBICIDES FOR MARSH HEDGE NETTLE (WHITEROOT)

BY

DOUGLAS J. DOOHAN[1]

Abstract: Metribuzin and mecoprop provided good control of top growth of marsh hedge nettle in a greenhouse screening test. Glyphosate did not appear to seriously affect the foliage but a field study revealed considerable reduction in growth from the rhizomes of treated plants.

INTRODUCTION: Marsh hedge nettle (*Stachys palustris L.*) commonly known as whiteroot is a noxious perennial weed infesting agricultural soils in many areas of New Brunswick. It spreads by seed and by a vigorous many noded rhizome system. It is particularly a problem in the vegetable farms of Maugerville and Sheffield. Presently there are no recommended control practices for this weed. This trial was set up to screen candidate herbicides for future field evaluation.

MATERIALS AND METHODS: Expt 1

Rhizomes of marsh hedge nettle were placed in cold storage on October 24, 1980. They were removed from storage on January 26, 1981 and planted in potting mixture in 10 cm clay pots on January 27. Of 50 rhizomes planted 44 produced plants. The plants were permitted to grow to the early flower bud stage and herbicide treatments (see Table 1) were applied on March 25. Each treatment was applied to 5 plants which were then arranged in the greenhouse. Observations on control were made on April 21.

Expt 2

In late June glyphosate at 4.0 kg/ha was applied to marsh hedge nettle in early bloom in a 5 acre section of a growers field. Ten days later the entire field was plowed. Observations were made in the field and also rhizomes from treated and from untreated sections of the field were planted in pots and observations made on their regrowth.

---

[1] Weed Specialist, New Brunswick Department of Agriculture and Rural Development.

RESULTS AND DISCUSSION: Expt 1

Glpyhosate at 4.0 kg/ha did not kill the marsh hedge nettle but did cause a marginal chlorosis and some stunting of the plant. Diquat gave a complete rapid kill but 4 weeks after treatment, regrowth was observed. Amitrol, along with metribuzin, had been reported as effective, (Huston, 1980) Amitrol caused considerable chlorosis, necrosis and stunting, but did not kill the plant. Metribuzin gave the best control, essentially a complete kill of the above ground parts. This treatment could potentially fit well in certain crop rotation schemes Mecoprop which is used primarily on turf grasses gave surprisingly good control of the foliage and no regrowth was observed.

Expt II

Pots planted with rhizomes from the glyphosate treated area of the field were several weeks later in shoot emergence than those planted from the untreated area. In addition, those shoots that did emerge were severely stunted, about a 90% reduction in vigor when compared to the shoots growing from untreated rhizomes.

Field observations confirmed those from the greenhouse. Marsh hedge nettle was much later in emerging from the glyphosate treated areas and the shoots were much less vigorous than those from the untreated section.

CONCLUSION: The greenhouse study indicated the two best potential controls for marsh hedge nettle to be metribuzin and mecoprop. Metribuzin could be used for total weed control in a crop such as potatoes. A potential problem with metribuzin might be residues that could injure following crops. Mecoprop could be applied in the spring on land to be planted late or in the fall for after harvest control. Since mecoprop is a hormone-type herbicide, there could be problems when used in close proximity to horticultural crops.

Greenhouse results with glyphosate were deceiving since the foliage was not seriously damaged. The field tests indicate that despite the apparent tolerance of marsh hedge nettle to glyphosate, the rhizome were actually damaged by treatment. Further study is necessary to determine the true efficasy of this treatment and the factors affecting it.

TABLE I

EFFECT OF HERBICIDE ON MARSH HEDGE NETTLE

Treatment	kg/ha	% Injury	Symptom
glyphosate	4.0	29	chlorosis, stunting
dicamba	1.0	18	chlorosis, stunting, leaf curl
bentazon	1.0	20	chlorosis, epinasty
diquat	1.0	95	necrosis, regrowth
asulam	2.0	41	chlorosis, necrosis, stunting
metribuzin	1.0	96	chlorosis, necrosis
amitrol	1.0	68	chlorosis, necrosis, stunting
mecoprop	2.0	74	chlorosis, necrosis, epinasty
trichlopyr	1.0	21	epinasty chlorosis
check		5	chlorosis

ACKNOWLEDGEMENTS: The assistance of Vegetable Technician, Emery Bernard and Vegetable Grower, Gerald Buyting, were gratefully appreciated.

REFERENCES: Huston, F. 1980 - Personal communication

DEMONSTRATION OF GROWTH REGULAR ON BARLEY

BY

C. McLEAN[1]

Abstract: Ethrel applied to Perth barley at the rate of 240 grams active per hectare, produced a marked reduction in plant height and length of peduncle. There appeared to be less lodging in Ethrel treated Perth barley than untreated.

INTRODUCTION: Spring cereals have long been grown in New Brunswick, however, the province is farm from being self sufficient in feed grains. This is largely due to low yields of the traditionally grown cereals, wheat, oats and barley.

One of the major problems in barley production has been that of lodging. A large part of the crop may be unharvestable due to breakdage of the straw. Interest has recently been shown in the use of growth regulators to alleviate this problem. One chemical, ethephon, sold under the trade name Ethrel, was demonstrated under New Brunswick conditions in 1981.

Ethrel has been marketed for some time for use in several crops. It is commonly used in fruit crops to synchronize and hasten ripening, thereby facilitating mechanical harvesting. It is also widely used in tobacco production.

Research at the University of Guelph has shown Ethrel to be effective in controlling early lodging in Bruce, Laurier and Mingo barley varieties. A corresponding significant increase was found in yield and harvest index.

To demonstrate the effect of Ethrel under New Brunswick conditions, a test site was established at Hillview Farms Ltd., Florenceville. This was a co-operative project between the New Brunswick Department of Agriculture and Rural Development, and the manufacturer, Union Carbide. Ten other demonstrations were located in Ontario, Quebec, Nova Scotia and Prince Edward Island.

---

[1] Field Crops Specialist, New Brunswick Department of Agriculture and Rural Development, Florenceville.

MATERIALS AND METHODS: A two hectare block from an eight hectare field of Perth barley was sprayed with Ethrel, at the rate of 240 grams active per hectare. The barley was at growth stage 10.

The barley was observed for differences in growth habit, lodging and maturity following application. The treated and untreated were both harvested in August, using a Hege plot combine, and yield data recorded. Subsamples were submitted for laboratory analysis.

RESULTS AND DISCUSSION: The Ethrel treated barley appeared to have less stem breakage and lodging than the untreated barley. Overall, plant height was reduced by approximately 20%, and the length of the peduncle was reduced by approximately 50%. Although neck breakage was not severe in the untreated barley, it was markedly less in Ethrel treated block. Yields were similar: 3871 kg/ha for the Ethrel treated block, compared to 3925 kg/ha for the untreated barley.

CONCLUSIONS: Observations on Ethrel treated barley indicate that the growth regulator is effective in reducing lodging and neck breakage, and therefore, has potential for increasing yield in varieties where these factors are a problem. Since response may vary between varieties, further testing is required to determine the effectiveness of this chemical in commercial barley production.

COMPARISON OF JAPANESE & TARTARY BUCKWHEATS[1]

BY

J. DAMBOISE[2]

Abstract: Two buckwheat species, Japanese (Fagopyrum sagittatum Gilib) and Tartary (fagopyrum tataricum L. Gaertn) were evaluated for yield and economics of production. There was no significant difference between them in these two manners. Both species gave a poor yield and a poor return per hectare.

INTRODUCTION: The term "buckwheat" can be somewhat confusing. While not a true cereal, buckwheat is generally classed with the cereals as handling of the crop and its grain is similar to cereal.

There are two species of buckwheat grown commercially in New Brunswick; Japanese buckwheat (Fagopyrum sagittatum Gilib) and Tartary buckwheat (Fagopyrum tataricum L. Gaertn). Both species belong to the Polygonaceae family. Their growth and reproductive habit are similar but some botanical characteristic differ (Fernald, 1970).

The tartary type, also known as the Red Straw buckwheat, because of its red straw at maturity, has greener flowers, smaller kernels, dull redish brown rough with grooved sides. This buckwheat is primarily grown as a green manure crop. In Madawaska County, it is grown primarily for human consumption. The flour derived from it is used to make a special pancake (plogue) replacing bread. The market for this variety is very limited.

The Japanese type usually has white flowers with honey-bearing yellow glands interspersed between the stamens. It has larger kernels, triangular in shape, smooth and varies in color from silver gray to shining black. The stem becomes brown at maturity. This type of buckwheat is grown on a smaller acreage almost exclusively in Kent County where it is grown for human consumption and exported to the United States. The market is

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Field Crop Specialist, New Brunswick Department of Agriculture and Rural Development.

almost unlimited with Japan being the largest customer for the Canadian buckwheat crop.

Both types are grown under the same agricultural practices. Usually, they are grown with little or no fertilizer and no pesticide. This project was conducted in co-operation with the Grand Falls Soil and Crop Improvement Association to evaluate the performance of the two types grown under the same agricultural practices.

MATERIAL AND METHODS: The Macan variety of the Japanese type buckwheat and a common variety of the tartary type was seeded June 12th on highly fertile potato land. Each species was seeded at 60 kg/ha with a conventional grain drill in 8 metres x 4 metres plots replicated 3 times in a randomized complete block design. All plots were fertilized with 100 kg (10-20-20) per hectare and received no pesticide. Plots were harvested by Hege combine on October 13th.

RESULTS AND DISCUSSION: No significant difference in yield between the two species was found (Table I). No significant difference between their breakeven selling price occurred (Table I). Yield of both species was low resulting in a poor financial return per hectare. The crop would have to be sold at unreal price to meet production costs. The low 1981 yields were due to many factors such as shattering but the lack of moisture and hot temperature recorded in July and August was important. Low seed set due to flower blasting, caused by hot, dry weather and high percentage of unfilled kernels, together with lack of moisture resulted in low yield. Buckwheat plants have a short tap root, that is less extensive than any of the true cereal grain plants. With their large leaf surfaces, this may add to the moisture stress during periods of drought (Campbell and Gubbels, 1977).

The Japanese type buckwheat was found to be significantly taller than the Tartary buckwheat, 17 cm taller on July 17th. This could mean that it would be a better green manure crop adding more organic matter to the soil.

CONCLUSION: Contrary to some growers predictions, the Tartary type buckwheat did not yield more than the Japanese type. As a green manure crop, the Japanese type would be preferable because of its greater vegetative growth. These results are only from one years data. Trends shown should be re-evaluated before large scale production is considered.

TABLE I. HEIGHT, YIELD AND BREAKEVEN SELLING PRICE OF TWO TYPES OF BUCKWHEAT GROWN IN NEW BRUNSWICK IN 1981

TYPE	YIELD (D.M. BASIS) KG/HA	HEIGHT* CM	BREAKEVEN SELLING PRICE** $40/KG
Japanese (Macan)	439	37	22.50
Tartary (Common)	222	20	46.13
Mean	330.5	28.5	34.31
C.V.	22.0%	7.2%	28.1%
L.S.D. 5%	256.2	7.1	33.9

* Recorded July 17, 1981.
** Calculated by dividing production cost by yield.

REFERENCES: Merritt Lyndon Fernald, 1970. Gray's Manual of Botany. Eighth Edication. D. Van Nostrand Company. p. 589.

Campbell, C. G. and G. H. Gubbels, 1977. Buckwheat for Profit. Agriculture Canada. Research Station, Norden, Manitoba. p. 8.

EVALUATION OF SEVEN LEVELS OF FERTILITY ON MACAN BUCKWHEAT[1]

BY

J. DAMBOISE[2]

Abstract: Seven levels of fertility (N-P-K) were evaluated on one variety of Japanese buckwheat. Results indicate that Macan buckwheat, seeded on high fertility soil, does not respond to fertilizer.

INTRODUCTION: Buckwheat is an excellent food for the people who advocate "natural food". It grows with little or no fertilizer, and does not require insecticides, fungicides or herbicides. Buckwheat is one of the better rotation crops providing increased yield and quality of potatoes (Benson and Stiles, 1974).

The question most often asked by growers interested in producing buckwheat is: Does buckwheat respond to fertilizer applications when seeded in rotation on a highly fertilized soil and, if so, what rate of fertilizer? The lack of information on buckwheat fertility requirements limits our response.

Research done in Manitoba (Campbell and Gubbels, 1978) has indicated that buckwheat responds well to fertilizer when soil fertility is low and a buckwheat crop that yields 1600 kg/ha removes 47 kg nitrogen, 22 kg phosphorus (P_2O_5) and 40 kg potassium (K_2O) from the soil for each hectare planted. The Quebec Buckwheat Production Guide recommends up to 22 kg N, 45 kg P_2O_5 and 45 kg K_2O per hectare on a high fertility soil.

This project, conducted in co-operation with the "Grand Falls Soil and Crop Improvement Association" evaluates seven fertility levels with one type of buckwheat and demonstrates the proper fertility program for that crop when seeded in rotation on a highly fertilized soil, i.e. potato land.

MATERIAL AND METHODS: The Macan variety of the Japanese buckwheat type was seeded June 12th on a highly fertilized potato land. A conventional grain drill was used for seeding the plots (8 metre x 4 metre). Seven fertilizer treatments (Table I) were

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Field Crop Specialist, New Brunswick Department of Agriculture and Rural Development.

applied at seeding. Each treatment was replicated three times in a randomized complete block design. All plots were harvested on October 13th, one day after the first killing frost (-2°C). No herbicide, insecticide or fungicide was applied as there was no need.

TABLE I. FERTILITY TREATMENTS EVALUATED ON MACAN BUCKWHEAT IN 1981 AT GRAND FALLS, NEW BRUNSWICK

NUTRIENTS, KG/HA APPLIED			ANALYSIS USED	RATE KG/HA	METHOD OF APPLICATION
N	P_2O_5	K_2O			
0	0	0	Nil	Nil	-
10	0	0	45-0-0	22	Broadcast
20	0	0	45-0-0	44	Broadcast
10	20	20	10-20-20	100	Drilled
20	20	20	15-15-15	133	Drilled
20	40	40	10-20-20	200	Drilled
30	30	30	15-15-15	200	Drilled

RESULTS AND DISCUSSION: For yield and plant height, there were no significant difference to the fertility treatments (Table II). Yields are low for all treatments. The low yields are due to a high percentage of unfilled kernels blown out during the cleaning process. The yield recorded in Table II are in kilograms per hectare on a dry weight basis after cleaning. Low seed set also reduced yield. Buckwheat is sensitive to high temperatures and hot, dry winds. Especially when moisture is scarce. These conditions cause flower blasting which reduces seed set and yield (Campbell and Gubbels, 1978). These conditions were recorded in the Grand Falls area during July and August, when buckwheat was at its peak of flowering.

CONCLUSION: This buckwheat fertility evaluation trial demonstrates that buckwheat does not need any fertilizer application if seeded in rotation with a highly fertilized crop such as potatoes. In this test, the Macan buckwheat did not respond to fertilizer application on high fertility soils.

These results are only from one year's data, thus, it shouldn't be considered yet as a reliable recommendation base.

TABLE II. EFFECT OF DIFFERENT FERTILITY LEVELS ON YIELD (KG/HA) AND PLANT HEIGHT (CM) OF MACAN BUCKWHEAT AT GRAND FALLS, NEW BRUNSWICK, IN 1981

FERTILIZER TREATMENT	YIELD (DRY MATTER BASIS)	PLANT HEIGHT*
0-0-0	449	45
10-0-0	448	43
20-0-0	545	45
10-20-20	488	48
20-20-20	545	47
20-40-40	597	47
30-30-30	544	45
Mean	517	45.7
C.V.	19%	14%
L.S.D. 5%	178	11

* Recorded July 17, 1981.

REFERENCE: Benson, J. Fred and Dwight G. Stiles, 1974. Buckwheat A Cash Rotation Crop for Aroostook County, Maine. Department of Agricultural and Resource Economics and Department of Plant and Soil Science. University of Maine, Orono. Co-operative Extension Service. p. 14.

Campbell, C. G. and G. H. Gubbels, 1978. Growing Buckwheat. Publication 1468. Agriculture Canada, Research Station, Morden, Manitoba. p. 10.

CEREAL DRILLBOX SURVEY

BY

K. J. MACISAAC*

Abstract: A Cereal Drill box Survey conducted in three areas of Southeastern New Brunswick - Sussex, Moncton and Sackville. Its purpose was to obtain data on: 1) Seed germination, 2) Seed quality and Source, 3) Agronomic practices related to seedling establishment.

INTRODUCTION: The growing and managing of any particular crop, usually begins with a recommendation to plant certified seed. However, since pedigreed seed entails higher planting cost, many farmers use either common or bin run seed.

Unfortunately common or bin run seed usually lowers yield as a result of several factors. First of all, either a germination percentage or a seed vigor rating cannot be guaranteed. Cereal grain head diseases were very common in the fall of 1980. (Slater, 1981) thus some lots of grain harvested in 1980 could have reduced germination and lack of vigor. Secondly, common seed may be contaminated with weed seeds or other species, which can weaken the stand. Finally, seed not certified is usually not treated. Treatment with an effective fungicide will reduce crop losses caused by both seed and soil borne diseases. In a trial conducted at Truro, during 1980, Vitaflo seed treatment on Atlantic barley resulted in 15% (7.4bu/acre) greater than the no treatment plot (N.S.D.A.M., 1980).

An Alberta seed drill survey conducted in 1980, showed there was a 12% increase in the use of seed treatment over 1973. However, there was still much room for improvement with only 66% of the seed used, achieving the grade of Canada No. 1 (CSGA, 1980).

Previous surveys by Agriculture Canada indicated that approximately 10.5% of seed grain used in New Brunswick is graded grain. (Spatial Planning 1981).

Generally it has been found that early planting produces higher yields. However, other Agronomic practices such as rate and placement of fertility are not as clear cut. The amount and type of tillage as well as the depth and fineness of seedbed could also be controversial among growers.

---

* Field Crops Specialist, N.B. Department of Agriculture and Rural Development.

With this in mind, the survey was carried out to evaluate grower practices and give direction to future efforts.

MATERIALS AND METHODS: In the spring of 1981, a survey was conducted with 6 farmers in the Sussex area, 5 farmers in the Moncton area and 3 from the Sackville area, providing data from 14 farms in the Southeastern part of the Province.

A sample of 100-200 grams was taken from the drillbox at planting. A germination test was done on each sample, as well as 1000 kernel weight. The sample was also checked for presence of weed seeds or other species.

Seed data was obtained on variety, source - purchased or own seed' grade - registered, certified, Canada # 1 and # 2, or bin run; and treatment.

Growers were questioned on the type of preplant cultivator used-spring tooth cultivator, vibra shank culvitator, disc-double or offset, and chain or drag harrows.

Planting information was obtained on: Type of seeder - broadcast, drill or brillion; row spacing; seeding rate; seeding date and fertilizer application rate.

In addition to recording the above agronomic practices it was intended that disease assessment be carried out at each location, but it was impossible to evaluate each one at a comparable growth stage.

RESULTS:

1. Seed Quality:

   Barley was grown on 71% of farms surveyed. Other farmers were growing oats and wheat. All species were pure stand with no mixtures found. 30% of the farmers surveyed did not know the name of the variety planted. 80% purchased their seed. 43% of the seed planted was cerified and 71% used treated seed.

   The average germination was 89%. Barley, the most common species had an average germination of 83% with a range between 52 and 100%.

One thousand kernel weights for barley ranges from 27.8 grams to 37.5 grams with an average of 34.1 grams. Oats and wheat averaged one thousand kernel weights of 28.5 grams and 36.3 grams, respectively.

Mustard and Wild Oats were the most common weed seeds found in the samples. Only 29% contained no weed seeds at all.

2. Agronomic Practices:

Grain was grown following hay on 42% of the farms surveyed, after corn on 29% and after grain on 29% of the farms. All farmers used a grain drill for seeding.

The seeding rate for barley varied between 84 and 120 lbs/acre with an average of 100 lbs/acre. The average seeding rates of oats and wheat were 111 and 123 pounds per acre respectively.

With regard to fertility, 36% of the farmers used manure, either in the spring or previous fall. Fertilizer in the ratio of 1:1:1 was equal to that of 1:2:1 and also to 1:2:2. Farmers applied an average of 30 lbs of nitrogen to grow an acre of barley. However the range varied from 9 to 60 lbs per acre. Phosphorus applications varied from 10 to 100 lbs/acre with an average of 49 pounds of actual phosphorus per acre. Anywhere from 24 to 62 lbs/acre of potassium was used with an average of 39 pounds of actual potassium being applied to grow an acre of barley.

The first grain was seeded on April 28 and the last on May 20, the majority was seeded around May 11.

For pre plant tillage operations, most people worked between April 20 and May 14 with the largest part being done around May 9. 29% used a spring tooth cultivator, 21% used a disc harrow, 7% used a vibra shank cultivator and 43% used a combination of cultivator types. Most growers made only 2 passes for primary tillage. To provide a firm seedbed 57% used a roller and only 7% used a chain harrow.

OBSERVATIONS AND CONCLUSIONS: Table 1 - comparison of recommended cereal practices with those being carried out on survey farms.

	Recommended Practices (Atlantic Field Crop Guide)	Farmer Practices (Average of farms surveyed)
Germination percentage (%)	85	89
1000 kernel wts - Barley	35.0	34.1
- Oats	30.0	28.5
- Wheat	27.5	36.3
Seeding rates - Barley	94	100
(lbs/acre) - Oats	85	111
- Wheat	120	123
Barley fertility - N	35-90	30
- P	35-90	49
- K	35-90	39

Although the average germination percentage was higher than the minimum requirement (Table 1), the range went as low as 52%. Those growers must have experienced severe misses.

A soil test should be made on each field to determine specific fertility requirements but in general farmers appeared to be on the low side, especially for nitrogen. This may have been compensated for, by the use of manure that many producers applied.

The survey encouragingly points out an increase in the acreage of barley over oats with some interest in wheat. Also encouraging is the amount of certified seed being used. Unformunately nearly one third were following a grain after grain rotation. This increases disease population which in turn decreases yield.

May 15 is usually considered the latest optimum planting date, but in the survey that date was moved ahead to May 11. This may have been partly due to the early spring planting season experienced in 1981.

Finally, contrary to many beliefs, most farmers were not excessively cultivating, with an average of only two passes being made.

REFERENCES: Canadian Seed Growers Association, February, 1981, The Seed Scoop.

Nova Scotia Department of Agriculture and Marketing, 1980, Cereal Trials, Soils and Crops Branch.

Slater, D.T., 1981 Treat Seed Grain for Germination, Farm Focus.

Spatial Planning, 1981, Southeastern New Brunswick Grain Study.

GRAIN YIELD SURVEY

BY

C. McLEAN AND J. DAMBOISE[1]

Abstract: Commercial fields of cereals were surveyed by Departmental personnel. Barley yields averaged 3464 kg/ha (64 bu/ac), wheat 3527 kg/ha (53 bu/ac) and oats 2864 kg/ha (75 bu/ac).

INTRODUCTION: Cereal production is becoming increasingly important in New Brunswick. Since the Atlantic region has traditionally been a net importer of grain, a market exists for an expanded cereal industry. The economics of cereal production have not been conducive to this, largely because of low yields.

Awareness of the benefits of a rotational crop for potatoes has maintained grain as a crop of major significance. Advances in production technology have made the possibility of consistently profitable cereal crops much more realistic.

To determine the relative efficiency of cereals in New Brunswick, representative fields were sampled; and yield, quality and soil data collected.

MATERIALS AND METHODS: Cereal fields were sampled as the grain was combined. Harvested weight was determined by measuring the sample area, and by weighing the combine before and after harvest with portable electronic scales. Grain samples and soil samples were submitted for laboratory analysis at the time of harvest.

RESULTS AND DISCUSSION: The 1981 season was very favourable for cereal production. Spring conditions allowed for early planting of the majority of the crop, although planting was not completed until mid-June, due to heavy rains in late May.

Favourable summer weather contributed to a successful crop, both in reducing disease severity, and permitting early harvest. The fields samples in this survey were combined between August 15th and September 8th.

---

[1] Field Crop Specialists, Florenceville and Grand Falls, respectively, New Brunswick Department of Agriculture and Rural Development.

TABLE I: YIELDS, QUALITY ANALYSIS, AND SOIL FERTILITY OF CEREALS SURVEYED

	Yield	D.M.	Protein		Soil Fertility			
	Kg/ha	%	%	pH	P	K	Ca	Mg
1. Barley	2863	91	9.5	5.6	VH	H	M	VH
2. Barley	2871	87	12.5	6.2	VH	VH	M	M
3. Barley	3258	86	12.5	6.1	VH	VH	H	M
4. Barley	2775	91	11.7	5.6	VH	VH	M	L
5. Barley	4113	91	10.6	5.9	VH	VH	M	M
6. Barley	4640	89	10.5	6.3	VH	VH	M	VH
7. Barley	3355	88	12.7	5.7	VH	H	M	M
8. Barley	3022	87	10.8	6.1	VH	H	H	M
9. Barley	4544	89	11.4	5.6	VH	VH	H	M
10. Barley	3075	87	11.9	5.9	H	H	M	H
11. Barley	3592	88	12.0	5.8	VH	H	M	L
12. Wheat	3941	87	12.2	5.7	VH	VH	M	M
13. Wheat	2139	87	9.8	5.8	VH	VH	H	L
14. Wheat	4130	86	11.4	6.0	H	VH	M	M
15. Wheat	4264	89	11.7	5.9	VH	H	H	M
16. Wheat	3726	87	11.3	5.6	VH	VH	M	M
17. Wheat	2960	88	11.9	5.5	H	M	M	L
18. Oats	3245	88	10.0	5.5	VH	H	L	M
19. Oats	2744	86	10.3	5.6	H	VH	M	M
20. Oats	2603	85	10.7	5.8	VH	H	H	M

Results are summarized in Table I. Barley yields ranged from 2775 to 4640 kg/ha; wheat from 2139 to 4264 kg/ha; and oats from 2603 to 3245 kg/ha. Soil fertility was found to be at high levels in all cases.

CONCLUSIONS: Overall yields of the fields sampled were very good. It should be noted, however, that there is a wide range in the yields of all three cereals. This indicates that with proper management, high grain yields are attainable in New Brunswick.

COMPARISON OF GRAIN MANAGEMENT SYSTEMS[1]

BY

C. McLEAN AND J. DAMBOISE[2]

Abstract: Opal wheat, treated with 400 kg/ha 15-15-15 at time of seeding yielded 3760 kg/ha, compared to 3640 kg/ha when treated with 45 kg/ha nitrogen at growth stage 2. There appears to be no economic advantage in applying phosphorus and potash to wheat grown on high fertility potato soils.

INTRODUCTION: Recently considerable interest has been given to intensive grain management systems, as practiced in Europe and studies have been undertaken to establish their applicability to New Brunswick conditions. Walker and Damboise (1980) reported there appeared to be no advantage in applying phosphorus and potash to wheat grown in high fertility potato soils, and that protein content could be significantly increased by the addition of nitrogen.

This trial was established to compare conventional and intensive management systems on a commercial basis and test the validity of previous findings.

MATERIALS AND METHODS: A four hectare demonstration field was selected at Hillview Farms Ltd., Florenceville. This was a high fertility potato soil, with pH 6.0, P_2O_5 460 , K_2O 300 , Ca 1240, and Mg 288.

Opal wheat was seeded using a pneumatic seeder leaving tram lines to facilitate nitrogen application during the growing season. One half of the field received a conventional fertilizer application of 400 kg/ha 15-15-15 broadcast at time of seeding. The other half received nitrogen only; 45 kg/ha N at growth stage 2. It was intended that nitrogen be applied at growth stages 1, 5 and 10, but unavailability of the pneumatic spreader prevented this.

Yields were calculated by weighing the combine before and after harvest with portable electronic scales. Subsamples of the wheat were submitted for laboratory analyses. The demonstration was planted May 9th and harvested September 8th.

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Field Crop Specialists, Florenceville and Grand Falls, respectively, New Brunswick Department of Agriculture and Rural Development.

RESULTS AND DISCUSSION: The conventional fertilizer application of 400 kg/ha 15-15-15 gave a yield of 3760 kg/ha compared to 3640 kg/ha for the 45 kg/ha application. Protein and dry matter levels were similar. Results are summarized in Table I.

CONCLUSIONS: Although the conventional application resulted in a slightly higher yield, part of this may be attributable to the higher nitrogen level involved. This would tend to support other findings that there is no economic advantage in applying phosphorus and potash to wheat grown on high fertility soils following potatoes.

Before intensive grain management of spring cereals is recommended, further testing should be done to study the response of particular varieties to high levels of nitrogen. Other components of the system, including fungicides and growth regulators, should also be evaluated.

TABLE I. YIELD, QUALITY, ANALYSIS OF OPAL WHEAT

	YIELD KG/HA	PROTEIN %	D.M. %
Conventional	3760	11.8	89
Intensive	3640	11.7	89

REFERENCE: Walker, D. F. and J. Damboise. Intensive Grain Management Project. Adaptive Research Reports, 1980. Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development. p. 168-172.

INTENSIVE GRAIN MANAGEMENT PROJECT 1981[1]
PROGRESS REPORT

BY

J. DAMBOISE, C. McLEAN AND D. WALKER[2]

Abstract: The Opal wheat plant development, yield and quality was significantly influenced by both the level and timing of fertility applications. The fungicide application reduced incidence of septoria fungi disease on the higher fertility treatments but at lower fertility levels did not have any effect. Even when significant reductions in disease infestation were evident, no responding increased in yield occurred.

INTRODUCTION: The intensive management of grain is widely practiced in Europe and has increased yield dramatically. Intensive management is a challenge to the conventional grain production method and could consist of many new added production techniques such as; increasing fertility levels including split application of nitrogen, increasing seeding rates, foliar fungicide application, growth regular application and use of tram lines. Conventional equipment can be used for seeding and fertilizer application but are often replaced to facilitate easier field operation.

Previous research in New Brunswick on some of these intensive management techniques (Walker, 1979; Walker and Damboise, 1980) has indicated that: a) on highly fertilized potato land there appears to be little or no yield response tothe addition of phosphorus or potash; b) nitrogen applications significantly increase wheat protein content; and c) there appears to be no economic advantage in increasing the seeding rate of wheat beyond 150 kg/ha.

The 1981 intensive grain management project was carried out to substantiate results obtained in the previous two years and further evaluate the effect of different nitrogen rates and timeliness of application on wheat yield, quality and plant development.

---

[1] Partially funded by Technology Transfer Program, ASA II.

[2] Field Crop and Cereal Specialists, New Brunswick Department of Agriculture and Rural Development.

The effect of a foliar fungicide spray was also evaluated for effectiveness on wheat fungi disease control and related effects on yield and quality.

MATERIALS AND METHODS: The project was conducted on highly fertilized potato land having a 5.6 pH and organic matter of 2. The treatments as displayed in Table I were evaluated on the wheat variety Opal. The wheat was seeded on May 8th at 150 kg/ha with a conventional grain drill seeder. The seeder was also used to apply the 15-15-15 fertilizer treatments. Urea, used as the nitrogen source, was broadcast at three rates at three different growth stages; early post emergence (G.S.1), early extension (G.S.5) and early heading stage (G.S.10). Plot size was 8 m x 3 m with each treatment replicated six times in a completely randomized block design. Three blocks received one Bravo foliar fungicide spray at the early heading stage of the wheat with the other three blocks being untreated controls. All plots were harvested on August 27th with a Hege plot combine.

RESULTS AND DISCUSSION: The responses of Opal wheat to the Bravo fungicide application and various fertility practices are summarized in Table I. Discussion of results follows:

Plants Population (Plants/m^2): A cereal plant population depends mostly on its seed quality, rate and depth of seeding. The treatments applied in this project did not and were not expected to affect the plant population.

Number of Heads Per Plant (Head/Plant): The number of heads that a cereal seedling will produce is not only related to its tillering ratio but also to the capacity of each tiller formed to produce a head of well-filled grains. It was found in this trial that an application of 80 kg/ha of nitrogen prior to heading, preferably at an early post emergence stage, significantly increased the number of head produced per seedling over non-fertilized wheat. Excessive nitrogen applied at that growth stage appears to be detrimental. The application of 120 kg/ha of nitrogen at G.S.1 significantly decreased the head/plant ratio over the 80 kg/ha nitrogen application.

Head Length: The unfertilized treatment gave significantly shorter heads than all other treatments. In general, split nitrogen applications at G.S.1 and G.S.5 significantly increased the head length as opposed to a single nitrogen application at G.S.1 or at seeding.

Table 1. Summary of response of opal wheat to one disease control and various fertility practices, 1981.

	Treatments					Plant Development				Disease %		Yield D.M.	
			Nitrogen kg/ha							Septoria			
Plot No.	Foliar Fungicide	15-15-15 with seed kg/ha	GS1	GS5	GS10	plant/ m^2	head/ plant	head length (cm)	plant height (cm)	leaf	glume	protein %	grain kg/ha
1	-	400	0	0	0	270	1.2	8.3	110.0	65.3	16.0	12.7	2940
1B	Bravo	400	0	0	0	245	1.3	9.0	113.3	34.6	9.3	13.1	3131
2	-	0	40	40	40	211	1.5	9.5	109.3	50.6	12.3	15.4	3225
2B	Bravo	0	40	40	40	224	1.5	9.7	115.0	11.6	8.0	16.1	3430
3	-	0	40	40	0	226	1.6	9.8	111.7	55.6	12.0	14.8	3244
3B	Bravo	0	40	40	0	216	1.6	9.5	112.7	29.6	9.3	14.9	3154
4	-	0	40	0	0	225	1.5	8.7	110.0	48.3	9.6	13.0	3143
4B	Bravo	0	40	0	0	236	1.3	8.7	108.3	42.3	10.0	12.7	3152
5	-	0	80	0	0	234	1.7	8.8	108.3	69.6	16.0	14.0	3088
5B	Bravo	0	80	0	0	230	1.8	8.8	114.3	40.0	8.6	14.0	3109
6	-	0	120	0	0	257	1.3	9.5	111.0	65.0	12.3	14.7	3185
6B	Bravo	0	120	0	0	242	1.4	9.7	115.0	26.0	11.3	15.0	2515
7	-	0	0	0	0	241	1.2	7.7	102.7	43.3	14.3	13.1	2381
7B	Bravo	0	0	0	0	229	1.0	8.3	101.7	44.0	15.0	12.7	2456
					Mean:	234.7	1.42	9.0	110.2	45.0	12.0	14.0	3010.9
					C.V.:	14.1%	24.2%	5.3%	2.5%	38.7%	23.6%	3.5%	8.2%
			L.S.D. 5 %		fertility:	N.S.	.33	.57	3.23	N.S.	N.S.	.58	293.9
					Fungicide:	N.S.	N.S.	N.S.	1.73	11.0	1.8	N.S.	N.S.

Plant Height at Maturity: The unfertilized wheat plants were significantly shorter than fertilized wheat. As well, Bravo significantly influenced plant height response to increasing fertility levels.

Disease: Only septoria fungi disease was surveyed although other fungi diseases were present in all plots. The Bravo application significantly reduced septoria on leaves and glumes of the more highly fertilized plots but did not on the low and no fertility treatments (4,7).

Wheat Protein Content: The highest protein level was obtained with the application of 40 kg/ha of nitrogen at all three growth stage of application. The protein level increased significantly as nitrogen rates increased. The lowest protein levels were recorded in the unfertilized and 15-15-15 plots applied at seeding.

Yield: The Bravo fungicide treatment did not increase yield. Unfertilized wheat yield was significantly lower than treatments receiving fertilizer. The highest yield was obtained with the application of 120 kg/ha of nitrogen split over all three growth stages of application (G.S.1, G.S.5 and G.S.10), but this was only significantly higher than treatment 6 which received the same amount of nitrogen but all at G.S.1 and treatment 7 which received no fertilizer.

CONCLUSION: For the third consecutive year, it was found that there are no advantages to the addition of phosphorus or potash to grow wheat on a highly fertilized potato land, except for maintaining the soil fertility level. Post emergence applications of nitrogen by itself maintains the yield and increases the protein content of the crop over the conventional 15-15-15 fertility practice. Split nitrogen applications at all three growth stages of application gave the highest protein yield (yield x protein content) per hectare.

The application of Bravo as a fungi disease control reduced the incidence of septoria only on the high fertility level treatments, however, corresponding increases in yield or protein were not evident.

Cereal growing habits, e.g., head/plant ratio, head length and plant height, are influenced by fertility levels. Also, plant height was increased by the Bravo application only on the highly fertilized plots.

REFERENCES: Walker, D.F. 1979. Intensive Grain Management Project, 1979. Adaptive Research Reports. Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development. p. 94-97.

Walker, D.F. and J. Damboise, 1980. Intensive Grain Management Project, 1980. Adaptive Research Report, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development. p. 168-172.

EFFECT OF SEED TREATMENTS ON WHEAT YIELD[1]

PROGRESS REPORT

BY

J. DAMBOISE AND C. MCLEAN[2]

Abstract: Five different seed treatments were evaluated to study their effect on yield of spring wheat. There was a significant increase in yield recorded with some treatments.

INTRODUCTION: Fungi diseases are one of the factors which limits yield and quality of N.B. grown grains. In order to achieve production of high yielding, quality crops, growers must limit disease development and resultant losses. Preventative measures are practical and desirable since few corrective measures can be taken once diseases appear in the field.

With the N.B. cold and moist spring conditions, a good seed treatment is an important preventative measure in limiting disease development. Seed treatment consists of applying a fungicide to the seed which destroys the fungi living on or in the seed. If these fungi are not destroyed they are then present when the seed germinates and can quickly invade and either weaken or destroy the young seedling. Seed treatments also protect cereal seedlings from disease-causing fungi in the soil, seedling blight and root rot. Improved stands are obtained through increased emergence, resulting in high yields of grain.

This project was initiated to verify the effect of four different seed treatments on wheat yield.

MATERIAL AND METHODS: A registered No. 2 Dundas wheat variety was hand treated with four seed treatments; Vitaflo 250, Vitaflo 280, CGA64251 and Baytan. One seed lot was left untreated for comparison. Each treatment was seeded on May 8th into 8 metre x 3 metre plots with a conventional grain drill and replicated three times in a randomized complete block design. The seeding rate was 150 kg/ha for all treatments and

---

[1] Partially funded by Technology Transfer Program, A.S.A. II.

[2] Field Crop Specialists, New Brunswick Department of Agriculture and Rural Development.

Table I. Cereal seed treatment evaluation, 1981.

Seed Treatment	Yield D.M. kg/ha	Plants per m^2	Heads per m^2	Septoria on Flaf Leaf %*
None	2483	184	265	75
Vitaflo 250	2806	188	251	80
Vitaflo 280	2502	174	248	95
CGA 64251	2993	178	312	68
Baytan	2776	137	265	80
Mean	2712	172.2	268.3	80
C.V. %	5.96%	15.8%	6.6	
L.S.D. 5%	304.2	N.S.	33.45	

*Disease survey on August 5th.

received 350 kg/ha of 15-15-15. The plots were harvested on August 27th with a Heggy combine.

RESULTS AND DISCUSSION: There was a significant increase in yield for treated treatments over the untreated seed lot with the use of Vitaflo 250 and CGA6525 (table I). Vitaflo 280, should theorically give better results than observed here. The reason for its poor response is unknown, it could be due to experimental error or lack of good seed coverage. Emergence was reduced with Baytan, possibly because of too much seed coverage, causing phytotoxicity. The yield seems to be directly related to severity of disease infestation, mainly septoria. Fusarium was also present in all treatments at about the same level of contamination in all plots.

CONCLUSION: The new, but not yet licenced, CGA64521 product seems to be advantageous in limiting disease development and increasing yield of wheat. With a commercial seed treater, the experimental errors could have possibly been reduced and give more accurate comparison between all seed treatment products. These are the results from only one year evaluation and should be considered as such.

SPRING MILLING WHEAT PRODUCTION EVALUATION[1]
PROGRESS REPORT

BY

J. DAMBOISE & F. MURRAY[2]

Abstract: During the 1981 growing season, four hundred and eighty acres of red spring wheat were grown in the Grand Falls and St. Quentin area. The protein content was not as high as hoped for but the entire crop was accepted for milling purpose with grades varying from No. 1 Canada Eastern Red Spring to No. 3 C. E. Red Spring. In general, it was a successful project but there are still some limiting factors that could slow down the widespread acceptance of this crop in the Northwestern part of New Brunswick.

INTRODUCTION: Within the period of 1973 to 1978, provincial grain acreage was relatively stable and averaged about 66,000 acres per year. Total production of oats, wheat, barley and mixed grain combined averaged 50,000 tons per year.

Oats, the lowest value market crop, was still predominant and accounted for 70% of plantings while the other three crops each accounted for approximately 10%. However, there has been a significant switch to wheat at the expense of oats; wheat acreage increased from 4,400 acres in 1974 to 9,600 acres in 1980, 1,050 acres produced pedigree wheat seed, the remaining produced livestock feed wheat.

In order to accelerate the switch from oats to wheat, production of wheat was tried for a higher market value than feed, that is, milling wheat. The market is available if the quality required is reached, if not, it could be sold for feed. This project was initiated to evaluate, on a commercial scale, the feasibility of producing a quality milling wheat acceptable for human consumption.

---

[1] Partially funded by the Market Development Branch, New Brunswick Department of Agriculture and Rural Development.

[2] Field Crop Specialist and Market Development Officer, respectively, New Brunswick Department of Agriculture and Rural Development.

MATERIAL AND METHODS: Four hundred and eighty acres were seeded in spring milling wheat in the Grand Falls and St. Quentin area. Seven growers participated in the project. The following practices were followed; certified Neepawa wheat bought in Manitoba, used Vita Flo 280 as seed treatment, seeded with a conventional grain drill, seeded on highly fertilized potato land, average pH of 5.5, land preparation consisted of secondary tillage only, not plowed.

The other cultural practices were slightly different i.e., seeding rate, such as indicated in Table I. The grain was harvested in favorable dry conditions and stored in proper, on-farm stroage, mostly all in aerated grain bins. The entire crop was stored in eight bins or lots from which the Canadian Grain Commission inspector took a representative sample for grading purpose. The samples were graded according to Table II. Each bin may contain the crop from more than one field but belonging to the same grower.

RESULTS AND DISCUSSION: The average yield for the entire acreage was about 50 bu/acre (Table I), and was not affected by the range in seeding rates. The higher seeding rate did not increase the yield over the lowest seeding rate.

The protein content of the crop varied from 11.9% to 14.1%. In general, the split application of Nitrogen at early heading was more effective in increasing the protein level compared to the 3 leaf stage. Usually, the protein content should be higher than those recorded especially with the level of Nitrogen applied to the crops.

Grades on the crop varied from No. 1 Canada Eastern Red Spring to No. 3 C.E.R.S. The lower percentage of hard vitreous kernels was responsible for degrading some lots to No. 2 and No. 3. Hard vitreous kernels are whole, reasonably sound kernels that even though moderately bleached, show clear evidence of vitreousness, e.g. the natural reddish colouring of red wheat which indicates hardness is visually apparent without dissection of kernels. According to Pomeranz (1964), vitreousness would be associated with high protein content. The same correlation was not found with this 1981 crop.

Table I seems to indicate some relation between the date of seeding and percentage of hard vitreous kernels. In a strange manner, the earlier seeded wheat contained the lowest percentage of hard vitreous kernel and vice versa, but at the same time, the earlier seeded

Table I. Spring milling Neepawa wheat production evaluation, 1981.

Bin or lot #	Total Acreage (acres)	Seeding		= days to harvest	Fertility Applied At Seeding		Nitrogen Split Application		Average yield (bu/A)	Canadian Grain Comm. Gradings		
		Rate (lbs/A)	Date		Analysis	Rate (lbs/A)	Rate (lbs/A)	Growth stage of Wheat		Grade No. C.E.R.S.	Reason % H.V.K.	Protein %
1	113	175	May 21	118	18-46-0	100	42 +42	3 leaf early heading	45	1	65 or better	12.1
2	69	125	May 15	110	15-15-15	125	33	early heading	48	1	65 or better	12.1
3	47	150	May 15	111	15-5-15	175	33	3 leaf	49	2	56	11.9
4	38	120	May 13	111	15-15-15	220	33	early heading	50	2	58	13.2
5	39	158	May 9	115	15-10-15	275	36	early heading	51	2	37	13.3
6	90	155	May 10	111	18-9-18	250	26	early heading	49	2	37	13.6
7	18	150	May 5	126	15-15-15	250	16 +16	early extension early heading	50	3	28	14.1
8	66	120	May 6	116	15-15-15	300	40	3 leaf	52	3	23	12.1

Table II. Grades of red spring wheat (Canada Eastern).[*]

	Standard of Quality				Maximum Limits of			
					Foreign Material Other Than Wheat		Wheats of Other Classes or Varieties	
Grade Name	Minimum Kilograms per Hectolitre	Variety	Minimum Percentage by Weight of Hard Vitreous Kernels	Degree of Soundness	Matter Other Than Cereal Grains	Total Including Cereal Grains Other Than Wheat	Contrasting Classes	Total Including Contrasting Classes
No. 1 Canada Eastern Red Spring	75	Marquis or any variety equal to Marquis	65	Reasonably well matured, reasonably free from damaged kernels.	Practically free	About 0.75%	About 1%	About 3%
No. 2 Canada Eastern Red Spring	72	Marquis or any variety equal to Marquis	35	Fairly well matured, may be moderately bleached, or frost damaged, but reasonably free from severely weather damaged kernels.	Reasonably free	About 1.5%	About 3%	About 6%
No. 3 Canada Eastern Red Spring	69	Any variety of red spring of fair milling quality	-	Excluded from higher grades on account of frosted, immature or otherwise damaged kernels.	Reasonably free	About 3.5%	About 5%	10%

[*] Taken from the Canadian Grain Commission Grain Grading Handbook for Eastern Canada, 1980.

TABLE III. 1981 BUDGET, FEED WHEAT VERSUS SPRING MILLING WHEAT NO. 2

	COST PER ACRE FEED	 MILLING
Material:		
Seed (140 lbs/acre)	$25.45	$31.82
Fertilizer (15-15-15, 250 lbs/acre)	31.25	31.25
(33-0-0, 100 lbs/acre)	-	13.63
Herbicide	4.65	4.65
Planting:		
Harrow (2X)	6.90	6.90
Seeding-Fertilizer	7.00	7.00
Nitrogen Application	-	3.00
Spraying	3.55	3.55
Harvesting:		
Combining	20.00	20.00
Other:		
Interest On Land	30.00	30.00
Total Production Cost/Acre	$128.80	$151.80
Average Yield 1981	1.636 t/ acre (60 bu)	1.364 t/ acre (50 bu)
Gross Return/Acre (November 15th Price)	$264.94	$310.99
Less Production Cost/Acre	128.80	151.80
	$141.14	$159.19
Less Transportation Cost/Acre	8.18	45.61
Net Return Per Acre	$132.96	$113.58

wheat received the higher rate of mixed fertilizer with the seed. Literature (Leonard and Martin, 1963) indicates that application of phosphates or mixed fertilizer that contains phosphates increased the yields but decreased the vitreousness.

Spring milling wheat was more expensive to produce than feed wheat in 1981 (Table III). Seed was more expensive because it was ordered from Manitoba for sanitary reasons. The split application of Nitrogen was also a precaution for higher protein levels and increased the production cost. This practice is commonly done in feed wheat production especially to yield 60 bu/acre but was not put in as a cost in the budget. Even with the higher production cost of $23.00/acre and 20% less yield, milling wheat would have returned $18.00 more per acre if it hadn't been for the higher transportation cost.

CONCLUSION: The 1981 production of spring milling wheat has demonstrated that it is possible to grow, on a commercial scale, a quality crop acceptable for human consumption. The dry weather condition was responsible for the low disease infestation but not entirely, the growers skills and preventional cultural methods were also responsible for the crop quality.

The transportation cost to the nearest market might be the limiting factor in increasing or maintaining the 1981 acreage. The transportation subsidy on western grains destinated in eastern provinces makes our unsubisidized milling wheat production less competitive.

Measures could be taken to increase the yield/hectare but, at the same time, the quality might not be as good. The use of local pedigree seed could reduce the production cost, but it should be treated properly with a systematic fungicide to be sure of low disease contamination.

REFERENCE: Pomeranz, Y. 1964. Wheat Chemistry and Technology. American Association of Cereal Chemists, Incorporated. St. Paul, Minnesota. p. 24.

Leonard H. Warren and John H. Martin, 1963. Cereal Crops. The MacMillan Company, New York, N.Y. p. 329.

GRAND FALLS WHEAT AND BARLEY VARIETY EVALUATION, 1981[1]

PROGRESS REPORT

BY

J. DAMBOISE[2]

Abstract: Six wheat varieties and ten barley varieties were evaluated to compare their performance under Grand Falls climatic conditions. Distinct differences were made on each varieties but they should be looked at carefully before changing varieties. It should be considered that the results are from one soil and climatic condition and one cultural practice. The varieties may perform differently under other conditions.

INTRODUCTION: Grain production is becoming more popular in the Grand Falls area because of the need of a rotationnal crop on potato land. The question of being or not being a rotationnal cash crop depends on many factors such as the selection of the proper species or variety for the overall farm conditions involved; climatic, soil, machinery and other facilities.

The "Atlantic Field Crop Variety Recommendation Guide", publication 100A, is being revised yearly to guide growers in their selection but does not recommend varieties for a limited area of a province or county. On farm trials of different varieties would help growers in their decision on a suitable variety.

Growers will often buy their seed from the most impressive salesman or lower priced seed with little knowledge of its expected performance in that specific area.

---

[1] Partially funded by Technology Transfer Program, A.S.A. II.

[2] Field Crop Specialist, New Brunswick Department of Agriculture and Rural Development.

This project was executed in cooperation with the "Grand Falls Soil and Crop Improvement Association" to demonstrate to local grain growers those varieties of wheat and barley which perform better under one climatic and soil condition. At the same time growers had an opportunity to see the performance of each variety when produced under similar conditions.

MATERIAL AND METHOD: All six wheat varieties and ten barley varieties were seeded on May 6th on a highly fertilized potato soil; pH 5.3, P_2O_5 460 , K_2O 300 . Barley was seeded at 110 kg/ha and was fertilized with 15-15-15 at 335 kg/ha applied with the conventional drill used for seeding both species. Wheat was seeded at 135 kg/ha and received 400 kg/ha of 15-15-15. All varieties were seeded in 8 metre x 3 metre plots and replicated four times in a complete randomized block design. The seed was certified or better seed grade and treated with Vitaflo 280. The varieties were all harvested on August 28th with a Heggy combine.

RESULTS AND DISCUSSION: Plants per square metre: Being seeded with the same cultural practices this data gives an idea on the quality of the seed used. The 1000 kernel weight would compensate for a small difference but shouldn't give a significant difference such as observed in table I and table II. Lower seed germination or lower vigor may be the cause for lower emergence and lower plant count per square metre. It might be a good idea to ask for the inspection certificate when a seed lot is bought.

# Heads per plant: Also known as the tillering ratio. It is known that barley usually tillers more than wheat. Table I and II illustrate the same trend. There was also a significant difference in tillering observed between varieties of the same species.

Head length: Significant difference between varieties was found (Table I & II); however, it is not necessarily related to higher yield.

Plant length: All wheat varieties seeded were relatively the same height at maturity except for Concorde which is a significantly shorter wheat. No lodging was observed with any of the varieties hence we could not see the effect of plant length on lodging resistance. There was significant differences within the barley varieties. The wheat plants were considerably taller than the barley plants except for Concorde.

Table 1. Grand Falls wheat variety evaluation, 1981.

Variety	Plants per m^2	# heads per plant	Head length cm	Plant height cm	1000 kl weight gm	Dry matter %	Yield D.M. basis kg/ha	Breakeven price $/40 kg at 86% D.M.
Dundas	194	1.9	9.4	110.0	35.3	85.0	3143	$3.73
Glenlea	246	1.4	11.0	111.2	39.9	84.5	2841	4.13
Neepawa	242	2.5	6.0	110.0	31.1	85.7	2674	4.39
Opal	260	1.1	9.0	112.5	33.9	85.0	3038	3.86
Vernon	247	1.4	9.5	110.0	31.8	84.2	2933	4.00
Concorde	240	1.6	8.1	58.7	34.8	83.5	3173	3.70
Mean	237.8	1.65	8.83	107.1	34.5	84.65	2965.4	3.97
C.V. %	7.9	22.0	1.5	3.6			5.25	
L.S.D. 5%	28.5	.8	.2	5.83			234.9	

Table II. Grand Falls barley variety evaluation, 1981.

Variety	Plants per m^2	# heads per plant	Head length cm	Plant height cm	1000 kl weight gm	Dry matter %	Yield D.M. Basis kg/ha	Breakeven price $/40 kg at 86% D.M.
Atlanta	193	2.4	8.0	86.2	45.4	85.7	3532	$3.08
Bruce	246	1.4	5.9	91.2	36.5	85.5	3231	3.37
Keystone	190	1.8	6.0	101.2	40.4	85.0	3426	3.17
Kinkora	145	2.6	6.6	97.5	43.6	86.2	3206	3.40
Laurier	145	2.5	8.0	90.0	48.2	85.7	3161	3.44
Loyola	198	1.8	6.5	93.7	40.8	86.5	2896	3.76
Summit	199	2.0	7.1	80.0	41.7	86.2	3100	3.51
Volla	240	2.6	6.6	87.5	39.7	85.7	3359	3.24
Perth	192	1.9	5.6	95.0	40.1	85.5	2820	3.86
Bonanza	201	1.9	7.0	107.5	36.7	85.7	3374	3.23
Mean	194.9	2.1	6.7	93.0	41.3	85.8	3210.3	3.41
C.V.	12.8	20.1	2.6	4.4			9.9	
L.S.D. 5	36.3	.61	.26	5.9			464.4	

TABLE III: Comparative 1981 budget, Wheat versus Barley*

		Cost per Acre	
		Wheat	Barley
Material:	Seed	21.82	18.18
	Fertilizer	43.75	37.50
	Herbicide	4.65	4.65
Planting:	Harrow (2x)	6.90	6.90
	Seeding - fert.	7.00	7.00
	Spraying	3.55	3.55
Harvesting:	Combining	20.00	20.00
Other:	Interest on land	30.00	30.00
TOTAL PRODUCTION COST/ACRE		$137.67	$127.78
Average selling price/40 kg (Nov. 15)		$ 6.15	$ 5.65
Average yield 40 kg/Acre		3.48	3.77
NET RETURN/ACRE		$ 76.35	$ 85.22

*The costs and prices listed may not relate to all production systems but the comparison should be about the same.

1000 Kernels Weight: Barley has in general a larger kernel weight or larger kernels than wheat. Glenlea has the plumpest kernel within wheat varieties and Laurier within barley varieties. The kernel size is a variety dependent characteristic but is also influenced by cultural practices eg. fertility.

Dry Matter: Gives a rough idea on the maturity of the crop when harvested. Barley was more mature than wheat over the same growing period. Concorde wheat was the least mature and Neepawa was the earliest for the wheat varieties. The difference in the barley varieties were less apparent.

Yield & Breakeven Price: There was a significant difference in yield per hectare between the wheat varieties (Table I). Neepawa, the spring milling wheat had the lowest yield and Concorde had the highest yield. There was also a significant difference in yield between barley varieties with Atlanta being the highest and Perth the lowest.

The breakeven price per 40 kg, calculated from the production cost (Table III) and yields, represents the lowest price each variety could be sold. Barley was in the average more profitable to produce than wheat, giving a higher return per acre (Table III).

CONCLUSION: The differences found between the two species and their varieties are the results of one year's evaluation only. The climatic conditions were more favourable than normal for the area. The 1981 growing conditions were almost perfect i.e. early seeding, no disease problem, no lodging and dry weather at harvest. A variety shouldn't be selected only because of its yield. Other conditions might be more important depending on specific farming operations and market demands. Different cultural practices could have affected the overall results of this trial.

Similar evaluation trials should be carried out for at least 3 years and it would be preferable if more growers in the area would come to inspect and evaluate the various varieties during the growing period.

EVALUATION OF AGRONOMIC CHARACTERISTICS OF WINTER CEREAL CULTIVARS ACROSS PLANTING DATES[1]

BY

D.F. WALKER, J. DAMBOISE AND C. McLEAN[2]

Abstract: Field studies were undertaken to evaluate yield, winter survival, lodging and spike number/m^2 of winter cereals planted on three dates and at two locations in the upper St. John River Valley of New Brunswick. Seven wheat cultivars (Triticum aestivum L.), two rye cultivars (Secale cereale L.) and one triticale cultivar (X. Triticosecale wittmack) were tested. Delaying planting from August 27 to September 19, reduced yields of 4 wheat varieties by 35.7% and spike number/m^2 by 40%. Late planting had no effect on winter survival, but did reduce lodging of 3 varieties.

INTRODUCTION: Spring cereals, wheat, oats, and barley, have been the grain crops traditionally grown in N.B. Winter cereals have not been grown because both farmers and extension personnel were not convinced they would survive the winter. In the past, winter cereals have been tested, but have not been recommended for commercial production. This may in part be due to inadequate management or the lack of winter hardiness in high yielding lines tested. Due to their many positive features such as high yield potential, milling quality, ideal planting and harvest schedules, and because of successes in Nova Scotia and elsewhere, the New Brunswick Department of Agriculture has established a project to evaluate winter cereal cultivars and species for commercial production.

Winter cereals generally outyield spring cereals where they can be grown. Stoskopf et. al., (1976) report that in Ontario, winter wheat outyielded spring wheat by 40%. Similar results have been found by many workers in areas of the world where both spring and winter wheats are grown.

---

[1] Partially funded by A.S.A. II Agreement

[2] Cereal Specialist, N.B.D.A., Fredericton, N.B., Area Crop Specialist, Grand Falls, N.B. and Area Crop Specialist, Florenceville, N.B. respectively.

There are several possible explanations of this phenomenon: (a) Reproductive development occurs during the cool spring days, this permits a longer period for tiller, spikelet and floral differentiation and development. This increased differentiation and development usually produces a greater number of spikes per unit ground area, a larger number of developed spikelets, and in some cases, a greater number of kernels per spikelet than spring grains. (b) Winter cereals are planted in the fall, grow for several weeks then go dormant with regrowth starting about mid April. The major portion of the growing season from mid April to the end of July is an excellent period for growth. The days are long, with many hours of sunlight; warm, but not hot; and usually ample moisture is available. (c) During April and May many of the diseases and insects that attack spring grains later in the season are not yet active. This permits winter cereals to become well established before pests become active. Earlier maturity of winter cereals help them to escape major disease and insect problems as well as summer droughts.

Because spring grains have been grown in N.B. for many years much is known about their growth habit, yield potential and agronomic requirements. Conversely, little is known about winter survival, yield potential or agronomic characteristics of winter cereals. The present study was initiated to: (a) Evaluate the potential of winter cereals under N.B. conditions. Yield, winter survival, lodging and spike number were determined for several cultivars of winter wheat, rye and triticale. (b) Demonstrate the potential of these winter cereals in N.B. agriculture. Planting and harvesting dates, seeding rates, fertility response and yield of the winter cereals were evaluated to determine how they might fit into existing agricultural practices.

MATERIALS AND METHODS: Seven wheat cultivars, two rye cultivars and one triticale cultivar were planted on three dates: August 26-27, September 9-11 and September 18-19 at two locations - Drummond and Florenceville. Due to late arrival and limited seed supply only six winter wheat cultivars, Monopol, Vuka, Koomoran, Clement, Lennox and Fredrick were planted on the first date. The second planting date (September 9-11) included the same winter wheats plus Norstar, 2 rye cultivars, Kustro and Animo, and one triticale cultivar, Wintri. The third planting date included nine of the 10 cultivars from the second planting date; Wintri, winter triticale was eliminated due to limited seed supply.

The overall statistical design was a split - split plot with each date at each location being a randomized block design with four replications. Seeding rate for all plots was 135 kg/ha; fertilizer (5-20-20) was applied with the seed at 450 kg/ha. The plot size was 8 x 2.3 m with all seeding being done with a model 510 International semi mounted drill seeder. A total of 95 kg/ha of nitrogen in the form of ammonium nitrate was applied at three different dates in the spring of 1981 (30 kg/ha April 21 and 65 kg/ha May 25).

Data on yield, winter survival, lodging and spike/m^2 were collected. In addition disease severity was noted.

Winter survival ratings were taken April 22, using a scale 0-10, (a score of 0 being 100% dead and a score of 10 being 100% survival). Lodging notes were taken just prior to harvest using a scale of 0-10, (0 - 100% lodged, 10 - 100% erect). Spikes/m^2 were determined just after the spikes had emerged. All spikes in a 0.4 m^2 plot (3 rows x 76.19 cm long) were counted. Yields were obtained by harvesting strips 1.25 m wide for the length of the plot with a Hege plot combine.[3] All yield data is expressed as tonnes/ha with moisture standardized to 14.5%.

At the Drummond location winter survival data were collected, but because of severe nonuniform winterkill, data on other parameters were not collected. In exposed areas of the site winterkill was complete, in sheltered areas the more hardy cultivars, Animo, Kustro, Norstar and Lennox had moderate survival (20-60%). The data reported in this paper are only from the Florenceville location. At the Florenceville location, six winter wheat cultivars, Monopol, Vuka, Koomoran, Clement, Lennox and Fredrick were common across all three planting dates. These were analyzed across dates as a split plot. Further analysis considered each date as a randomized block design for comparing cultivars within the individual date.

---

[3] Harvest date - August 11

RESULTS: Winter survival was excellent over all dates with an average of 99.75% survival date 1, 96.04% for date 2, and 98.13% for date 3.

Analyzing the four cultivars that did not lodge, Monopol, Vuka, Clement and Koomoran, there is a highly significant yield reduction across planting dates. From planting date one, the mean yield was 5.88 t/ha, date 2, 5.26 t/ha and date 3, 3.78 t/ha. A reduction of 10.5% from date 1 to 2, 28.1% from date 2 to 3, and an overall reduction of 35.7% was shown. Much of this yield reduction can be explained by reduced spikes/m^2 from date 1 to date 3.

If all six cultivars are included there is no significant difference between date 1 and date 2, this is due to reduced yield of Lennox and Fredrick in date 1 caused by severe lodging (see Table 1).

The change in spike number with cultivars and planting dates is highly significant. The mean spike number/m^2 for the six wheat cultivars for date 1 is 547, date, 405 and date 3, 331. A reduction of 141 spikes/m^2 from date 1 to 2 and a further reduction of 64 from date 2 to date 3, an overall reduction of 215 spikes/m^2 from date 1 to 3. This is a reduction of 40% over the three planting dates.

Lodging was not a factor with the cultivars Monopol, Vuka, Koomoran, or Clement. However, it was the major yield determining factor for Lennox and Fredrick on date 1, but became progressively less important from dates 1-3. The mean lodging rating for Lennox and Fredrick at date 1 were 0.0 and 3.87, date 2, 5.88 and 9.5, date 3, 8.8 and 9.88 respectively.

The next section will present results for each planting date individually. Date 1 (See Table 2):

There was a significant difference in yield among the six cultivars. Vuka had the highest yield of 6.16 t/ha, the lowest yielding variety was Lennox with 3.56 t/ha, but as explained earlier, much of this yield depression was due to lodging.

Winter survival was not statistically different among the six cultivars.

Differences in lodging were highly significant among cultivars. The European cultivars, Monopol, Vuka, Clement, and Koomoran were 94-100% standing whereas Lennox was rated as being flat and Fredrick had only 40% of the stem standing.

Vuka had a significantly lower spike number/m^2 than the other five cultivars. Even with the low spike number (436) it produced the greatest yield, indicating very large spikes.

TABLE 2. Comparison of varieties planted August 27/81 for yield, winter survival, spikes/m^2 and lodging

Parameter Variety	Yield	Winter Survival	Spike/m^2	Lodging
Monopol	5.79 a*	10 a	532 a	10 a
Vuka	6.16 a	9.9 a	436 b	9.4 a
Koomoran	5.56 ab	9.6 a	598 a	10 a
Clement	6.02 a	9.9 a	583 a	10 a
Lennox	3.56 c	10 a	579 a	0 b
Fredrick	4.28 b	9.9 a	552 a	3.8 b
∓	5.23	9.9	546	7.2

Table 1. Comparison of varieties of winter wheat across three planting dates for yield, winter survival, spikes/m^2 and lodging.

Parameter	Date	Monopol	Vuka	Koomoran	Clement	Lennox	Fredrick	Mean
Yield t/ha	1	5.79	6.16	5.56	6.02	3.56	4.28	5.23
	2	5.43	5.62	4.68	5.32	5.21	5.09	5.22
	3	3.77	4.06	3.50	3.79	4.34	4.53	4.00
	Mean	5.00	5.28	4.58	5.04	4.37	4.63	4.82
Winter Survival[a]	1	10.0	9.9	9.6	9.9	10.0	9.9	9.9
	2	9.8	10.0	9.8	9.6	9.5	9.0	9.6
	3	10.0	9.9	10.0	10.0	9.9	9.1	9.8
	Mean	9.9	9.9	9.8	9.8	9.8	9.3	9.8
Spikes/m^2	1	532	436	598	584	579	552	546
	2	514	325	426	342	387	433	404
	3	364	304	351	332	308	331	331
	Mean	470	355	459	419	425	439	428
Lodging[b]	1	10	9.38	10	10	0	3.88	7.21
	2	10	10	10	10	5.88	9.5	9.23
	3	10	10	10	10	8.75	9.88	9.77
	Mean	10	9.79	10	10	4.88	7.75	8.74

[a] 10 = 100% survival; 0 = completely killed.

[b] 10 = standing upright; 0 = flat.

Date 1 = August 27, 1981

Date 2 = September 9, 1981

Date 3 = September 19, 1981

TABLE 3. Comparison of varieties planted September 9 for yield, winter survival, spike m^2 and lodging

Parameter Variety	Yield	Winter Survival	Spike/m^2	Lodging
Monopol	5.43 a	9.8 a	514 a	10 a
Vuka	5.62 a	10 a	325 de	10 a
Koomoran	4.68 bc	9.8 a	426 bc	10 a
Clement	5.32 ab	9.6 ab	342 de	10 a
Lennox	5.21 abc	9.5 abc	387 cd	5.88 b
Fredrick	5.09 abc	9.0 bcd	434 bc	9.5 a
Norstar	3.26 e	8.9 cd	463 ab	4.3 b
Kustro	4.52 cd	1.9 e	272 e	9.88 a
Animo	5.38 ab	6.8 e	325 de	10 a
Wintri	3.92 de	8.8 d	303 e	1.8 b
$\bar{x}$	4.84	8.4	379	8.1

*values followed by the same letter in the same column are not significantly different as determined by Duncan Multiple Range test P=0.05

Date 2 (See Table 3):

Yield differences among cultivars were highly significant. Vuka had the highest yield with 5.62 t/ha; the lowest yielding cultivar was Norstar with 3.62 t/ha.

Winter survival was significantly different for the 10 cultivars. Vuka had 100% survival whereas the two rye cultivars had the lowest, Kustro 18.75 and Animo 67.5. The reduced survival of the two rye cultivars is due primarily to snow mold. Even though the ryes had reduced survival, they had the ability to yield relatively well. This could be due to the ability to compensate by increasing tiller number or by producing larger spikes.

Lodging was again highly significantly different among cultivars. Lennox, Norstar and Wintri ranged from 17-59% standing, the remaining cultivars ranged from 95-100% standing.

Differences in spike numbers/m^2 were highly significant among cultivars due mainly to poor winter survival and the tendency for rye to have fewer spikes.

Date 3 (See Table 4):

Yield for the highest yielding cultivar Amino rye at 5.39 t/ha to the lowest yielding cultivar, Norstar, at 3.45 t/ha were highly significant.

The more winter hardy cultivars, Norstar, Kustro and Animo, appeared to have greater yield stability at the later planting dates than the less winter hardy cultivars of Monopol, Vuka, Koomoran and Clement. From date 2 to date 3 the less hardy cultivars had a mean yield reduction of 1.48 t/ha whereas the hardy cultivars had a yield reduction of .11 t/ha. However, it should be noted that the yield of the less hardy cultivars is much higher than the hardy cultivars in date 2. This indicates that late planting has a strong negative effect on the less hardy cultivars whereas it has essentially no effect on the hardy cultivars.

TABLE 4. Comparison of varieties planted September 19 for yield, winter survival, spikes/m^2 and lodging

Variety	Yield	Winter Survival	Spike/m^2	Lodging
Monopol	3.77 bc	10 a	364	10 a
Vuka	4.06 bc	9.9 a	304	10 a
Koomoran	3.5 c	10 a	351	10 a
Clement	3.79 bc	10 a	332	10 a
Lennox	4.34 b	9.9 a	308	8.8 b
Fredrick	4.53 b	9.1 a	332	9.9 a
Norstar	3.45 c	8.9 a	465	9.1 b
Kustro	3.98 bc	5.2 b	468	10 a
Animo	5.39 a	7.1 b	304	10 a
∓	4.09	8.9	336	9.8

Differences in percent survival were significant among cultivars with all wheats having 89% or better. The two rye cultivars, Kustro and Animo had 52% and 71.25% respectively. Reduced winter survival was mainly due to snow mold infestation.

There were significant differences in lodging, but all cultivars stood well, therefore, it was not a factor in yield differences.

The number of spikes/m^2 were significantly different among cultivars, however, all cultivars had low spike populations. From planting date 2 to planting date 3, the cultivars Monopol, Vuka, Koomoran, and Clement had a mean reduction of 64 spikes/m^2, whereas Norstar, Kustro had a reduction of only 7 spikes/m^2. This could possibly explain the yield stability of the hardy cultivars.

DISCUSSION: The four European cultivars, Monopol, Vuka, Koomoran, and Clement respond similarly across planting dates. All four had excellent lodging resistance and winter survival. As planting date was delayed from August 27 to September 19 there was a progressive, significant decline in both yield and spike number/m^2. These cultivars have very good agronomic characteristics and should be evaluated further for use as potential cultivars and in breeding programs. The three Canadian cultivars, Lennox, Fredrick, and Norstar had good winter survival and spike populations, however, all three had poor lodging resistance and Norstar appeared to have a low yield potential in the environment tested.

The two rye cultivars had adequate yields, excellent lodging resistance, but very poor winter survival due to susceptibility to snow mold.

The triticale cultivar was only planted on date 2, therefore, few conclusions can be drawn other than it grows very tall (170 cm) under N.B. conditions, appears to have little lodging resistance, but does have acceptable yields and winter survival.

This study confirms what many researchers have found in the comparison of winter cereals to spring cereals. It also demonstrates that winter cereals are capable of producing very high yields in N.B. The average yield for the six cultivars on date 1 is 5.23 t/ha (78 bu/A) which is almost twice the provincial average for spring grains. This is on a plot basis and cannot be extrapolated directly to a commercial situation, but does give an indication of the potential. These results also must be interpreted in view of the fact that data are from only a single location and year, and that there was severe winter injury at the Drummond location.

From the parameters measured there are indications that with later planting dates both yield and spike number/m^2 are reduced. Yield was reduced by an average of .373 t/ha/wk after August 27.

There also appears to be a reduction in lodging of some cultivars as planting dates are delayed. Planting dates do not appear to have a significant effect on winter survival.

From this preliminary study, the following recommendations can be made:

1. Farmers should be encouraged to grow winter cereals on a limited trial basis.
2. Cultivar evaluation, winter survival and agronomy experiments should continue to further evaluate winter cereals under N.B. conditions.
3. The study area should be expanded to include the main grain growing areas of the province.
4. European wheat would appear to have good potential from early plantings.

The author wishes to thank John Monteith, N.B. Department of Agriculture, for assistance in plot maintenance and data collection, and Duane Falk, a Ph.D. student at the University of Guelph for help with the statistical analysis and constructive comments on the manuscript.

REFERENCES: Stoskopf, N.C., R.K. Nathaniel and E. Reinbergs. 1974. Comparison of Spring Wheat and Barley with Winter Wheat; Yield Components in Ontario. Agronomy Journal Vol. 66: 747-750.

WINTER WHEAT DEMONSTRATION[1]

PROGRESS REPORT

C. McLEAN, K. MacISAAC, J. DAMBOISE, AND D. WALKER[2]

ABSTRACT: Twelve demonstration sites were established in New Brunswick in 1981 to evaluate the performance of the winter wheat cultivar Lennox. Agronomic data will be collected in 1982 to determine the potential of this cultivar in New Brunswick.

INTRODUCTION: Winter cereals have not been widely produced in New Brunswick on a commercial basis. Lack of information on winter hardiness, yield potential, etc., has not permitted agronomists to recommend them in a cropping program. Recent research has indicated that winter cereals have a definite potential in New Brunswick. Walker et. al., 1981, report that in New Brunswick, six winter cereal cultivars yielded 5.23 t/ha (78 bu/acre) in a replicated field trial, which is nearly twice the provincial average for spring grains.

Several other potential advantages exist with winter cereals. A premium price is paid for that grain which meets milling quality standards. Agronomic benefits, such as improved soil structure, increased organic matter content, erosion control during late fall and early spring periods, and competition with weeds during early spring are all positive factors. Timeliness of field operations also allows winter cereals to fit into many cropping programs to maximize the efficient use of machinery and labour.

To determine the potential of winter cereals on a commercial scale in New Brunswick, demonstration sites were selected in the major grain producing areas of the province, in order to evaluate their performance under a wide range of conditions and management practices.

---

[1] Financially supported by Technology Transfer Program, A.S.A. II.

[2] Field Crop Specialists, Florenceville, Sussex, and Grand Falls respectively, and Cereal Specialist, Fredericton, New Brunswick Department of Agriculture and Rural Development.

MATERIALS AND METHODS: Seed of the winter wheat variety Lennox was distributed to twelve producers in Victoria, Carleton, Queens, Kings, and Westmorland counties. Sufficient seed was supplied for a three to five hectare demonstration in each location. A seeding rate of 135 kg/ha was recommended. Seeding dates ranged from August 25 to September 22.

Fertility programs varied, depending on the previous management of the demonstration field. Fall fertilization consisted of applying 10 to 20 kg/ha nitrogen, and 0 to 80 kg/ha of phosphorus and potash. The recommended spring practice will be a split application of nitrogen only.

During 1982, data will be collected on winter survival, disease problems, crop management, and yield.

REFERENCE:

Walker, D. F., J. Damboise and C. McLean. 1981. Evaluation of Agronomic Characteristics of Winter Cereal Cultivars Across Planting Dates. 1981 Adaptive Research Reports, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

WINTER RYE AS A COVER CROP[1]

INTRODUCTION

BY

J. DAMBOISE, I. GHANEM AND J. L. DAIGLE[2]

Abstract: The effectiveness of winter rye as a cover crop in reducing soil losses is directly related to the percentage of land covered by the established winter rye crop. The preliminary results recorded up to now tends to favor the seeding of winter rye shortly prior to harvesting the potatoes as the best establishment method offering us the most coverage for the winter.

INTRODUCTION: Soil erosion is a serious problem in the potato region of New Brunswick. Engineering soil conservation practices need to be supplemented by effective agronomic practices, such as providing a cover crop during the fall and spring. The work done in Maine and Prince Edward Island indicates that winter rye can be effective for its agronomic potential benefit. In New Brunswick; however, it should be evaluated before it could be communicated to growers.

This project was established to: evaluate the effectiveness of winter rye as a cover crop in reducing soil losses in intensively cultivated erodible land; develop a management package for winter rye establishment; evaluate the effectiveness of plowing down winter rye crop on potato yield and quality; and introduce a comprehensive soil erosion control measure to prevent further degradation of the land base.

METHODS: This demonstration project is executed in co-operation with the Grand Falls Soil and Crop Improvement Association.

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Field Crop Specialist, Soil Specialist and Agricultural Engineer, respectively, New Brunswick Department of Agriculture and Rural Development.

Winter rye (variety Kodiak) was seeded at three different dates over a 5% slope potato field; ten days before harvesting (Sept. 8th) half a day before and immediately after harvesting the potato crop on September 18th.

The seed was broadcasted at two rates, 125 and 250 kg/ha. Each treatment was seeded over one acre plot of the field. All plots will be plowed down in the spring of 1982 and replanted to potatoes. The control treatment consists of one acre not seeded to winter rye.

RESULTS AND DICUSSION: The seedling population per square metre (Table I) is the only data available at the time of writing of this report. Data regarding soil losses will be available in the 1982 progress report.

Seeding winter rye just before harvesting the potato crop gave the best land coverage, especially with the higher seeding rate.

A lower plant count was registered with the rye seeded immediately after harvest. This could be attributed to the lack of seed coverage, thus a lower germination rate. Seeding ten days prior to harvesting also resulted in a lower plant population. It had already emerged before harvesting the potatoes but a low percentage of them survived the soil disturbance created by the potato harvester. Even if it was seeded ten days earlier, they were at about the same height as all the other plots on October 26th, that is approximately 6 cm.

CONCLUSION: Seeding winter rye shortly prior to harvesting the potato crop seems to be the best establishment method offering us the most coverage for the winter. Similar results were obtained at the Charlottetown Agriculture Canada Research Station (Sadler, 1980).

TABLE I. EFFECT OF SEEDING RATE AND DATE ON SEEDLING POPULATION PER SQUARE METER*

Seeding Rate kg/ha	Seedling Population per cm^2		
	Seeding Date		
	Sept. 8	Before Harvest Sept. 18	After Harvest Sept. 18
200	65	131	83
125	55	94	55

*Data recorded on October 28, 1981.

REFERENCE: Saddler, J. M. 1980. Pre-potato harvest seeding of fall rye as a cover crop for control of soil erosion after main crop potatoes. Interim report, not published.

SOYBEAN FEEDING TRIAL[1]

FINAL REPORT

BY

J. DAMBOISE, M. SNODDON, D. TAYLOR[2]

Abstract: There was no difference in either milk or butterfat production between dairy cows fed raw soybeans, and those fed soybean meal as the primary source of supplemental protein.

The trial accomplished its main objectives - demonstrating that locally grown soybeans can be successfully processed on-farm and fed to dairy cows as a protein supplement.

INTRODUCTION: New Brunswick imports 100% of its soybean requirement as a Livestock protein to mix in rations. With the early varieties now available, soybeans could be grown successfully but the perceived difficulties in handling and processing the crop for livestock feed, limits its widespread acceptance. The introduction of the Brady Crop Cooker would be feasible to process the crop for monogustric animals but requires a large horse power unit for satisfactory operation. Such equipment is readily available on a potato farm but not necessarily available on a livestock farm. Guelph research (MacLeod 1974) indicates that soybeans need not be cooked prior to feeding to functional ruminants such as dairy cows.

This trial was conducted to evaluate the performance of locally grown soybeans as a dairy protein supplement compared to the more traditional soybean meal.

---

[1] Financially supported by Technology Transfer Program A.S.A. II.

[2] Field Crop Specialist, Livstock Nutritionist, Assistant District Agriculturist, New Brunswick Department of Agriculture and Rural Development.

MATERIALS AND METHODS: The soybeans used for this trial were supplied by the "Soybean Production, Utilization - Variety Evaluation" project (Damboise, 1980). The varieties feeding values are illustrated in Table I. The crop was dried to 89% dry matter immediately after harvest and forwarded to Ken Graham, a dairy producer from Centreville who agreed to carry out the feeding trial with his dairy herd.

Only cows producing more than 40 lbs. of milk per day (December R.O.P. test) were put on the feeding trial. These cows were divided into two groups (12 cows per group) based on production, fat test, days in milk and Latation number.

The two treatment groups received one of the following 32% protein mixtures as a topdressing on their allotment of mixed grain:

Mixture #1 (Group A)	Mixture #2 (Group B)
50% wheat	10% wheat
50% soybean meal (48% protein)	90% raw soybeans

Both mixtures were ground with a portable grinder-mixer once per week. The topdressing rates were as follows:

Production Level, Lb/day*	Supplement lb/day
40-50	.6
51-60	1.2
61-70	2.6
71-80	3.4
81-90	4.3
91-100	4.6

*Based on most recent R.O.P. test available.

All cows received the same forage ration which consisted of haylage and hay, both of which contained approximately 12% protein on a dry basis. As well, all cows received the same basic grain mixture (Table II) at a rate of 1 lb. for every 2.5 lbs. of milk produced.

The duration of the feeding trial was twelve weeks with 4 milk tests during the trial.

Table I

Soybean Nutrient Content

Variety	Dry Matter* %	Nutrients, % Dry Matter Basis		
		Protein	Calcium	Phosphorus
Mapple Arrow	80	40.9	.23	.68
McCall	80	40.3	.20	.68

*Dry matter content at harvest

Table II

Basic Grain Mix

Product	Amount (kg)
Soybean meal	40
Oil cake	40
Salt	15
Molasses	50
Mineral	50
Baking Soda	10
Magnesium oxide	2
Wheat	440
Oats	935
Vitamin ADE	1

RESULTS AND DISCUSSION: There was no difference in either milk or butterfat production between cows fed raw soybeans, and those fed soybean meal. Although some research trials have shown increases in butterfat content of milk due to the extra fat content in the raw soybeans. (Larson, Schultz, 1970). This was not the case in this trial.

According to the producer involved the cows preferred the raw soybean mixture over the soybean meal. The fact that it was a coarser feed containing less wheat, may explain this observation.

Table III

Milk and Fat Production

	Group A Soymeal		Group B Raw Soybean		Average Production Month	
	lbs/day	Fat %	lbs/day	Fat %	lbs/day	Fat %
December R.O.P.	58.7	4.09	58.6	3.95	58.65	4.02
January R.O.P.	57.9	3.85	57.6	3.75	57.75	3.8
February R.O.P.	55.9	3.77	54.6	3.72	55.25	3.74
March R.O.P.	45.75	3.95	45.91	4.16	45.83	4.05
Average Production 4 months	54.56	3.91	54.18	3.89	54.37	3.90

CONCLUSION: The trial accomplished its main objectives- demonstrating that locally grown soybeans can be processed on-farm and fed to dairy cows with no problem. They store well, process easily, and are capable of substaining milk production levels equal to that seen with the more traditional soybean meal.

Growing soybeans may be an important addition to New Brunswick cropping programs and may allow some dairy producers to reach protein self-sufficiency. The long-term economics of growing soybeans will determine the feasibility of local production.

REFERENCES: MacLeod, G.K., 1974. Soybeans in Dairy Rations. Ontario Agricultural Handbook. Agdex 410/64.

Damboise, J., 1980. Soybean production, utilization and variety Evaluation. 1980 Adaptive Research Reports, Plant Industry Branch, N.B. Department of Agriculture and Rural Development, p. 162-164.

Larson, S.A., Schultz, L.H., 1970. Effects of Soybeans Compared to Soybean Oil and Meal in the Rations of Dairy Cows, Journal of Dairy Science, Vol. 50, P. 1233.

SOYBEAN INOCULANT EVALUATION[1]

BY

C. McLEAN, J. DAMBOISE AND K. MacISAAC[2]

Abstract: Soybeans treated with granular inoculant yielded significantly greater (985 kg/ha) than those treated with powdered inoculant (652 kg/ha) or urea (688 kg/ha), when grown in a new field. No significant difference was found between levels of treatment.

INTRODUCTION: Soybeans have been grown to a limited extent in New Brunswick for more than a decade. Although yields have been lower than desired, the possibility of producing a locally grown protein crop has maintained interest in soybeans.

One positive factor with soybeans is that they are a legume; having the ability to convert atmospheric nitrogen to a usable form via bacteria living in root nodules, and thereby reducing fertilizer costs. Subsequent crops may also benefit from residual nitrogen and improved soil structure.

Since New Brunswick soils do not have a natural population of soybean rhizobia, it is necessary to inoculate with these bacteria during seeding to induce nodulation. The inoculant is available in both granular and powdered forms.

The granular form is relatively new and consists of rhizobia encased in small granules of peat, which protects the bacteria from dessication and heat. The powdered form is produced by mixing the bacteria with powdered peat. The numbers of live bacteria may be greatly reduced by heat, drying, etc., so refrigeration of the inoculant is important.

The recommended method of application for granular inoculant is place it below the seed. When a grain drill is used for planting, the granular inoculant may be applied through the forage seed box, providing tubing is attached to deliver the inoculant into the seed spouts. Powdered inoculant is usually mixed with the seed, with a material such as corn syrup used to facilitate sticking. Powdered inoculant is relatively inexpensive, while granular costs approximately two dollars per kilogram.

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Field Crop Specialists, Florenceville, Grand Falls, Sussex, respectively.

Results elsewhere have shown that when soybeans are grown in a field for the first time, the use of granular inoculant produces yield increases sufficient to warrant its extra cost. To test the effectiveness of these forms of inoculant under New Brunswick conditions, a trial was established at Hillview Farm Ltd., Florenceville, during the 1981 growing season.

MATERIALS AND METHODS: This trial was located on a high fertility soil (following potatoes): pH 5.4; O.M. 3.5%; P_2O_5 460 ; K_2 0300 ; Ca 1452; Mg 104. The fertilizer, 300 kg/ha of 5-20-20, was harrowed in prior to seeding.

The variety Maple Presto was seeded at the rate of 100 kg/ha, with 18 cm. row spacing, using a conventional grain drill. Three different treatments were compared: granular inoculant, powdered inoculant and urea; at three levels of treatment. The soybeans were seeded in 3 m x 8 m plots, replicated 3 times in complete randomized blocks, for a total of 27 plots. The powdered inoculant was mixed with the seed, while the granular inoculant and urea were applied to the ground surface.

The trial was planted on May 25th are harvested on October 13th, using a Hege plot combine.

RESULTS AND DISCUSSION: All yields were relatively low. The soybeans treated with granular inoculant yielded significantly greater than those receiving powdered inoculant or urea. There was no significant difference between the powdered inoculant and urea treated soybeans. No significant difference was found between levels of the various treatments.

The higher yield obtained with the granular inoculant more than overcomes the higher cost of treatment, when compared with powdered inoculant. Yield of soybeans receiving urea was not sufficient to warrant this type of nitrogen source.

Results are summized in Table I.

TABLE I

YIELD OF SOYBEANS (KG/HA) USING UREA, GRANULAR INOCULANT, AND POWDERED INOCULANT AT FLORENCEVILLE IN 1981.

TREATMENT	RATE (KG/HA)		YIELD (KG/HA)
Nitrogen (from urea)	0		516
	40		728
	80		806
		Mean	688a[1]
Granular	10		889
	20		942
	30		1122
		Mean	985b
Powder	.8		720
	2.4		844
	4.8		392
		Mean	652a

LS.D. 5% Inoculant: 224.3

[1] Means followed by the same letter are not significantly different.

CONCLUSION: The reduced yield at the highest level of powdered inoculant is probably attributable to experimental error. A problem with the seeder may have affected the plots. Further testing should be done to evaluate the relative performance of powdered inoculant. Since powdered inoculant is relatively inexpensive, high rates of application would be feasible if increased yields were obtained.

The results of this trial indicate that granular inoculant produces a higher yield than either powdered inoculant or urea applications, when grown in a field for the first time. Since there was no significant difference between levels of tratment, it is not possible to recommend a specific application rate from this trial. Further studies are required to determine the most economically feasible rate of granular inoculant.

REFERENCES: Damboise, J. Soybean Production, Utilization and Variety Evaluation, 1980. Adaptive Research Report, p. 162-164. Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

Hume, D. J., W. D. Beversdorf and R. J. McLaughlin, 1979. Getting Into Soybeans. Planting and Growing The Crop. Ontario Ministry of Agriculture and Food.

Ontario Ministry of Agriculture and Food, Soybeans. Publication 296. 1981 Field Crop Recommendations.

SOYBEAN VARIETY EVALUATION[1]

BY

K. J. MACISAAC, J. DAMBOISE AND C. MCLEAN[2]

Abstract: Three soybean varieties, Maple Presto, McCall, and Maple Arrow, were evaluated at two locations, Florenceville and Sussex. The three varieties averaged 1124, 1987 and 1542 kg/ha, respectively. In addition to yield, the percent protein and percent dry matter of each variety was also compared.

INTRODUCTION: Soybeans are not a totally new crop to New Brunswick. They have been grown in the Upper Saint John River Valley, and also in the Kent-Westmorland region. Interest in the crop has increased due to increasing prices of soybean oil meal and other protein supplements for livestock feed.

In 1980, two of the earliest soybean varieties were evaluated in the Florenceville area. A dairy herd was selected in Centreville to evaluate the grown soybeans as a protein supplement for dairy cattle.

In general, the feeding trial has shown that soybeans grown here are of comparable quality to beans grown elsewhere in Canada or the United States. Yields, however, have not been comparable and one year's data to recommend production of a crop to growers is not considered reliable. 1980 was a very wet year and data collected from such a year is not representative of a normal year.

This project was designed to evaluate three varieties comparing their performance in two areas, thus evaluating production techniques for primary producers.

MATERIALS AND METHODS: Each trial location was on high fertility land: Florenceville (after potatoes) - pH 5.4; O.M. 3.5; P_2O_5 460-; K_2O 300-; Ca 1452; Mg 104; statement of measurement. Sussex (after alfalfa) - pH 6.7; O.M. 3.1; P_2O_5 405; K_2O 300-; Ca 2780; Mg 120.

In this variety trial, three soybean varieties were evaluated at Florenceville and Sussex; Maple Presto,

---

[1] Financially supported by Technology Transfer Program, ASA II.

[2] Field Crops Specialists, Sussex, Grand Falls and Florenceville, respectively, New Brunswick Department of Agriculture and Rural Development.

McCall and Maple Arrow. A seeding rate of 100 kg/ha was combined with an 18 cm row spacing at each location. A granular inoculant was applied to the ground surface at the rate of 20 kg/ha. 300 kg/ha of 5-20-20 was harrowed in prior to seeding.

A conventional grain drill was used to seed all varieties into small plots (3m x 8m), replicated three times in complete randomized blocks to provide nine plots per location. A Heggie combine was used to harvest the plots. The Florenceville trials were planted on May 25th and harvested on October 13th. The Sussex location was planted on May 22nd and harvested on October 14th.

For weed control, it was intended that Basagran be applied post-emergence. However, it was impossible to obtain the chemical before the plants reached the 4th trifoliate leaf stage and therefore hand hoeing had to be carried out.

RESULTS AND DISCUSSION: Yield - Although McCall averaged slightly better than Maple Arrow (Table I), the yield advantage is not statistically significant. Again, due to extreme variation, Maple Arrow's yield advantage over Maple Presto is not significant. Other researchers have found similar variation with Maple Presto (OMAF, 1980). Overall yields were higher than in 1980. Damboise reported 1230 kg/ha and 897 kg/ha for Maple Arrow and McCall respectively in 1980.

There may be some explanation for this. Climatic data would indicate 1981 was generally a better growing season (Smith, 1981). It was longer with more heat units and a later fall frost. Rainfall was adequate, but not excessive during the critical times.

Secondly, the trials were harvested with a small plot harvester and not a field combine. Therefore, losses were not as high. Growers must accept the fact that early maturing varieties, adaptable to New Brunswick, have a low pod set which increases harvesting losses. A combine with a flexible cutter head will minimize these losses. The importance of harvesting at the proper time of day was also noted. In mid-afternoon, pods were very dry and brittle, which increased shattering losses. Both seed and equipment suppliers recommend harvesting during those periods of the day having higher humidity.

Dry Matter - With planting in late May, and late fall frost, 1981 provided sufficient heat units to give excellent maturity on the beans. Traditionally, this has been one of the biggest deterrents to Maritime soybean production, as many varieties are bred for use in high heat unit areas. The heat unit requirements for the respective varieties are: Maple Presto - 2100, McCall - 2550, and Maple Arrow - 2550. Good maturity is necessary to allow moisture levels low enough for practical storage.

At the Sussex location, Maple Presto, McCall and Maple Arrow reached dry matter levels of 73.4%, 82.2% and 83.0%, respectively. Since soybeans should not contain more than 14% moisture for storage, each variety would require drying.

Protein - Protein percentage can be affected by the plant's nitrogen intake. This, in turn, relates to nodulation on the soybean roots. The roots did exhibit nodule formation, but nodules were not of the proper size, nor was the interior of the deep red color, characteristic of healthy rhizobia. This could be attributed to spreading inoculant on the ground surface rather than applying it with the seed. Exposure of the rhizobia on the soil surface to heat and dessication, resulted in poor initial nodulation. Protein percentage (Table II) ranged from 34 to 39%. This is comparable to an average figure of 40%.

Pest Management - Weed control in soybeans, as in any other crop, was found to be extremely important. With no herbicide application, annual grasses seemed to be the biggest problem. The beans competed favorably with broadleaved weeds later in the season. A bronzing on the leaves, noticed early in the season, was diagnosed as a bacterial blight, *Pseudomonas glycinea.* This disease is seed borne but there is no seed treatment available for bacteria. The seed came from an area of high humidity which provides an excellent growing environment for the organism.

CONCLUSION: Although plant populations seemed low and somewhat unsatisfactory, Maple Arrow and McCall yielded between 22 and 28 bushels per acre. Soybeans are a low canopy crop making yields deceptive. Yields from Maple Presto were very unstable. Although it may have the earliest maturity rating, its consistency is not dependable. Each grower intending to plant soybeans on a large scale must be in a position to harvest them without high combine losses. Therefore, a floating cutter bar is essential.

Since they are susceptible to both environmental damage (cold) and physical damage (equipment), soybeans require intensive management by capable operators from planting through to feeding.

TABLE I. YIELD (KG/HA) OF SOYBEANS GROWN IN NEW BRUNSWICK FOR 1981

	Florenceville	Sussex	Average
Maple Presto	1254*	993	1124
Maple Arrow	1455	1629	1542
McCall	1744	2050	1897

*No significant difference between varieties.

TABLE II. % PROTEIN (D.M. BASIS) OF SOYBEANS GROWN IN NEW BRUNSWICK FOR 1981

	Florenceville	Sussex	Average
Maple Presto	32.7*	35.0	33.9
Maple Arrow	36.9	37.0	37.0
McCall	38.0	39.0	38.5

*No significant difference between varieties.

REFERENCES: Damboise, J. Soybean Production, Utilization and Variety Evaluation, 1980. Adaptive Research Report, p. 162-164. Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

Ontario Ministry of Agriculture and Food, Soybeans. Publication 296. 1981 Field Crop Recommendations.

Smith, P. J. 1981 New Brunswick Weekly Weather Summary. Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

BIO-CONTROL OF CANADA THISTLE
PROGRESS REPORT
BY

D. B. FINNAMORE[1]

Abstract: Two insect species, a fly, Urophoria cardui L., and a weevil, Ceutorhynchus litura (F.), were monitored at the release sites at Sussex, Kings Co., and effects on the biological control of Canada thistle were observed.

INTRODUCTION: Two biological control programs for Canada thistle were reported on previously, (Finnamore, 1979). The release sites were monitored in 1981 for the insects; the fly, *Urophora cardui L.*, and the weevil, *Ceutorhynchus litura (F.)*. Observations were made of the effects of the two insects on stands of Canada thistle.

RESULTS: *U. cardui L.* populations have increased greatly in the 1980 and 1981 growing seasons at both release sites. The flies established well and are dispersing beyond the release sites in the Sussex area. The insect larvae cause galls to form on the stems of the thistle plants. In spot areas, the fly population was large enough to cause numerous galls on the plants. In such areas, Canada thistle flower and seed production was reduced by the galls.

The galls have been found five kilometers from the release sites, indicating a good dispersal of the flies. The adults were first dispersed along the small streams and intervals. In 1981, galls were found on the hillsides one hundred meters above the streams.

Thistle plants on the release site were also checked in June for the weevil, *C. litura (F.)*. Only one weevil larva was found mining in a thistle stem. Whereas the 1981 season was early, sampling for the insects may have been too late to find the larvae in the thistle stems.

---

[1] Provincial Entomologist, New Brunswick Department of Agriculture and Rural Development.

RECOMMENDATIONS: The release sites and area should be monitored for changes in the insects populations and observations made of the effects of the two insect species on Canada thistle stands.

REFERENCES: Finnamore, D. B. 1979. Bio-Control of Canada Thistle, 1979, p. 83-84. *In* New Brunswick Department of Agriculture and Rural Development, Plant Industry Branch. Adaptive research reports 1980.

BIO-CONTROL OF THE RAGWORT WEED

PRELIMINARY REPORT

BY

D. B. FINNAMORE[1]

Abstract: A flea beetle, Longitarsus jacobaeae was released at Sussex, Kings Co., for the biological control of the ragwort weed.

INTRODUCTION: The ragwort weed, *Senecio jacobaea L.*, is poisonous to livestock and was introduced from Europe, (Finnamore, 1979). In 1979, ragwort stands had been greatly reduced by the cinnabar moth. In 1980, weed stands increased due to a reduction in cinnabar moth populations. The flea beetle, *Longitarsus jacobaeae*, was released in the area in 1981. The beetle larvae feed on the roots of ragwort plants. The injury caused by the larval feeding should weaken ragwort plants and help to prevent fluctuations in the number of ragwort plants when cinnabar moth populations are low.

METHODS: One hundred and eighty-five adult beetles were released on pasture land on the farm of Mr. K. Brown, Sussex, Kings Co. The insects were obtained through the Biological Control Section, Agriculture Canada, Regina, Saskatchewan.

RECOMMENDATIONS: The release site will be monitored for several years to determine if the beetles become established and their effect on the ragwort plants.

REFERENCES: Finnamore, D. B., 1979, Bio-Control of Ragwort Weed in New Brunswick, p. 85-86. *In* New Brunswick Department of Agriculture and Rural Development. Plant Industry Branch. Adaptive research reports 1980.

---

[1] Provincial Entomologist, New Brunswick Department of Agriculture and Rural Development.

WEED CONTROL IN SEEDLING ALFALFA

BY

D. J. DOOHAN[1]

Abstract: Eptam at 1.0 kg/ha active ingredient (a.i.) gave good weed control and crop tolerance in an alfalfa weed control demonstration and experiment. Treflan at 0.75 kg/ha a.i. gave good weed control and excellent crop tolerance and yield.

INTRODUCTION: The acreage of alfalfa grown in New Brunswick has been steadily increasing for several years. This has been a very positive trend for the livestock industry, however, alfalfa production has been accompanied by serious weed problems.

In grass forage production, herbicides such as 2,4-D and MCPA could be effectively used to control broadleaf weeds with no risk of crop injury. However, with alfalfa, the available herbicides have been neither as effective nor as safe to the crop. The butyric acid herbicides Embutox and Tropotox require very specific timing to give good control and crop tolerance. Eptam and Treflan herbicides require preplant incorporation techniques with which few livestock farmers have been familiar (Publication 75, 1981).

MATERIALS AND METHODS: In the spring of 1981, it was decided to start a herbicide evaluation program for alfalfa and to demonstrate recommended practices of weed control on grower fields.

Two farms were selected in the Sussex area to demonstrate the proper application of Embutox and Tropotox on new seeded alfalfa and timothy-alfalfa mixtures. On both farms, the grower applied the herbicides, supplied through the Department of Agriculture, with their own spray equipment.

---

[1] Weed Specialist, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

In the Fredericton area, a demonstration of Eptam herbicide, preplant incorporated, was set out. The herbicide was applied with a three-point hitch mounted field sprayer on May 11th and immediately incorporated with a tandem disk. The field was disked a second time at right angles to the initial incorporation. The two perpendicular discings are required to uniformly mix Eptam in the soil. Properly incorporated in the upper 10 cm of soil, Eptam forms a gas that kills susceptible seedlings as they germinate. Iroquois alfalfa was seeded over the entire field on May 12th.

On the same field, an experiment was established to evaluate a large number of recommended and experimental herbicide treatments (Table I). Preplant incorporated herbicides were applied to the experimental area on May 12th and incorporated with a garden tiller. Iroquois alfalfa was seeded with grower equipment the same day. Postemergence herbicides were applied on June 5th, when the alfalfa was in the two trifoliate leaf stage.

Weed control and crop tolerance ratings were made on the experimental plots on July 2nd and plots were harvested on July 10th (Table I).

RESULTS AND DISCUSSION: Weed control was poor at both Sussex demonstrations. At one site, sprayer problems resulted in application of a herbicide rate too low for effective control. Poor control at the second site was likely due to spraying at the wrong time. Both Embutox and Tropotox must be applied postemergence between the first and third trifoliate leaf stage of alfalfa to ensure the best control and the least crop injury (Publication 75, 1981).

Weed control was excellent at the Fredericton demonstration. The Eptam treated area, when compared to an untreated section of the field, had about 80% fewer weeds. Eptam gave good control of lambsquarters, redroot pigweed, dandelions from seed and some control of quack grass. Although some minimal herbicide injury to the crop was observed shortly after emergence, it was outgrown and an excellent stand of alfalfa was obtained. Crop injury consisted of stunted growth and deformed leaves. This injury would likely not have occurred if planting had been delayed four to seven days after spraying as suggested on the Eptam label.

TABLE 1.
HERBICIDE TREATMENTS FOR WEED CONTROL IN SEEDLING ALFALFA

TREATMENTS			ALFALFA		YIELD	BLW	REMAINING WEEDS
Herbicide	Rate a.i. kg/ha	timing	Stand	Vigor	G.D.M./Plot	Stand	
Eptam	3.25	ppi	13	18	1576	68	lq, dl, ms
Treflan	0.75	ppi	7	9	1942	73	lq, dl, sp, ms, qg
Eptam + Embutox	3.25 1.0	ppi post	18	22	1576	95	
Eptam	1.0	post	10	18	1568	92	dl
Embutox + Asulox F	0.6 1.1	post	10	17	1521	92	cl
Treflan + Embutox	0.56 1.0	ppi post	8	20	1660	92	dl, qg
Tropotox	1.4	post	17	28	1328	90	dl, qg
Brominal	0.3	post	12	20	1563	90	dl, qg
Treflan + PP009	1.0 0.50	ppi post	7	10	1691	73	lq, dl
Brominal + MCPA	0.56	post	28	45	978	90	dl
MCPA	0.70	post	67	87	217	92	dl, qg
Lorox + MCPA	0.28 0.56	post post	8	17	1773	87	lq, bg
Basagran	1.0	post	2	3	2108	17	lq, rp, sp, qg
Untreated control			2	3	1920	17	lq, dl, qg

a.i. - active ingredient

G.D.M. - Grams Dry Matter

LQ-Lambsquarters, DL-Dandelion, MS-Mustard, SP-Shepherds purse, QG-Quackgrass

BG-Barnyard Grass, RP-Redroot Pigweed.

Growers should avoid excessive spray overlap when applying Eptam as this may also increase the risk of crop injury.

Very interesting results were obtained from the herbicide evaluation experiment (Table I). The highest yields were the untreated check and Basagran at 1.0 kg/ha. However, weed control was very poor. Yields included both alfalfa and a large amount of weeds; therefore, the figures reported do not reflect the actual yield of alfalfa.

The second highest yield was with Treflan at 0.75 kg/ha preplant incorporated (ppi). With the exception of Basagran, this treatment caused the least crop injury and excellent weed control was obtained.

Eptam, Eptam ppi plus Embutox post, Embutox and Tropotox all gave good weed control but more crop injury and lower yields.

As in the demonstration, the injury with Eptam was likely due to seeding immediately after spraying. Embutox at 1.0 kg/ha caused an initial knockdown of the alfalfa that appeared to be serious; however, the crop largely recovered. The injury with Tropotox at 1.4 kg/ha was more severe and this was reflected in the yield.

Of the unregistered treatments, Brominal at 0.3 kg/ha may have potential.

CONCLUSION: Eptam gave excellent control of weeds and had good crop tolerance at the Fredericton demonstration. Growers are recommended to postpone seeding at least 4 days after spraying to prevent crop injury.

It is difficult to form conclusions from the 1981 experiment. It does demonstrate that several herbicide treatments are available that will give excellent weed control.

This experiment clearly illustrates that correct timing of application is essential with Embutox.

Excellent control, low crop injury and high yield with Treflan at 0.75 kg/ha show the need to further evaluate this chemical and to demonstrate it to growers.

ACKNOWLEDGEMENTS: The assistance of Forage Specialist, Stephen Clare; Sussex Area Field Crops Specialist, Kevin MacIsaac; Field Crops Technician, John Monteith; growers Willis Anderson and Arthur McKnight of Sussex and George Evans of Fredericton was greatly appreciated. Appreciation is expressed to Co-op Atlantic, Moncton, New Brunswick, for supplying Tropotox herbicide.

REFERENCES: Ontario Ministry of Agriculture and Food, 1981. Publication 75 - The Guide to Chemical Weed Control. p. 31-34.

SUSSEX REGIONAL CORN TRIAL

BY

S. G. CLARE AND K. J. MACISAAC[1]

Abstract: Each year, new corn hybrids become available to farmers in the Maritimes. Trials are conducted to ensure that any recommended hybrid can achieve a certain agronomic performance.

INTRODUCTION: The Atlantic Corn Hybrid Evaluation Committee makes a decision to recommend or remove corn hybrids from the recommended list on the basis of data from Regional Corn Silage Trials. Co-operative trials are conducted by Federal and Provincial Departments of Agriculture at six locations in New Brunswick, Nova Scotia and Prince Edward Island, to evaluate new hybrids and re-assess performance of hybrids presently available.

MATERIALS AND METHODS: Thirty-two corn hybrids were planted in a moderately well-drained interval soil on May 15, 1981 at Sussex, New Brunswick (LF 104684). Planting procedures followed the guidelines of the Atlantic Corn Hybrid Evaluation Committee.

The trial was maintained as required throughout the summer. Bird damage was controlled by protecting ears with nylon mesh "socks".

The trial received a killing frost on October 4th and was harvested by Kemper forage harvester on October 6th. Data taken were: number of plants, number of broken stalks and silage yield on a green plant basis. Two subsamples from each plot were oven-dried to estimate dry matter.

Data were analyzed by Agriculture Canada, Kentville, Nova Scotia, as a complete randomized block design with four replications.

---

[1] Forage Specialist and Field Crops Specialist respectively, New Brunswick Department of Agriculture and Rural Development.

Table 1. Yield and percent dry matter of thirty-two corn hybrids at Sussex, N.B. in 1981.

Hybrid Name	Yield t/ha	Dry Matter %
Funk G8025	13.80	41.2
KG 0-0377	13.36	40.8
Adour 296	12.69	40.5
PX403	12.29	40.5
RX23	14.01	39.8
Pickseed 2111	12.58	39.6
SL207	16.35	39.4
Pride R097	12.70	38.4
Funk G4086	15.61	37.8
H78-1565	14.48	37.4
Thompson 7901	13.63	36.8
X7754	11.97	36.8
Thompson 7904	13.07	36.6
Pride R108	15.91	36.5
DK-23	12.51	36.3
Stewart 2501	15.45	36.3
Funk G4082	14.70	36.0
Co-op S259	16.64	36.0
PAG SX111	14.46	35.9
TXS82	14.75	35.3
PX414	15.54	34.8
DK-22	12.21	34.8
Stewart 7923	13.34	34.7
DK-24F	14.81	34.5
Bishop 30-30	15.49	34.3
PX11	16.83	34.2
Labonte 35	16.39	34.1
X1760	14.51	33.8
271219	13.96	33.7
H78-1352	15.21	33.6
Oseco 950	15.65	33.2
80-15	14.86	29.5
MEAN	14.37	36.4
C.V.	9.17	7.1
L.S.D. 5%	1.84	3.6

RESULTS AND DISCUSSION: Results of the Corn Silage Trial at Sussex are presented in Table 1. From data collected at Sussex and other locations, the Atlantic Corn Hybrid Evaluation Committee made its recommendations for 1982.

Yield tests are carried out each year to ascertain the yield level and agronomic characteristics of presently available and new hybrids. Hybrids are added to the Recommended List when testing shows them to yield comparably to presently available hybrids. Hybrids are removed when their yield no longer meets the standards.

In selecting a hybrid, a farmer should refer to Bulletin 140 "Atlantic Corn Hybrid Evaluation Trials" which lists the recommended hybrids. Hybrids are listed in order of decreasing dry matter at harvest. Amount of dry matter at harvest determines the quality of silage made. Silage can be made safely with plants from 28-35% moisture at harvest. A farmer should choose from those hybrids that obtain this level of dry matter in his area.

FORAGE YIELD SURVEY 1981 - CORN

BY

S. G. CLARE AND K. J. MACISAAC[1]

Abstract: Yield surveys on seven fields of corn are reported. Good growing conditions in 1981 contributed to high yields.

INTRODUCTION: Growing conditions for corn in New Brunswick in 1981 were generally good. An early planting (first and second week of May) was followed by wet weather. Corn that had not established a good root system by that time appeared yellow and stunted. Some areas suffered water stress in late July and August. Late fall frosts extended the growing season in most areas. Weather during harvest was average.

The yield survey samples reports on-farm yields to provide yield information on crops and some of the farming practices used producing these yields.

METHODS: Crops were sampled similar to perennial crops.

RESULTS AND DISCUSSION: Corn ensiles best when the moisture of the whole plant is 32 to 37%. Harvest at or near the first killing frost makes use of the full growing season. Delaying harvest after the killing frost allows the corn to dry down but results in a loss of digestible dry matter.

Yield surveys in 1981 were done in late October. Fields sampled are not representative of the best corn on the farms as the co-operator would normally harvest their better corn first. On several of the farms, the field sampled was the last to be harvested. This accounts for the high dry matter levels recorded for co-operator 1.

The mean yield of all surveys in 1981 at 7.2 tonnes of dry matter per acre is down from the 1980 estimate of 10.0 tonnes due to the same fact.

---

[1] Forage Specialist and Field Crop Specialist, respectively, New Brunswick Department of Agriculture and Rural Development.

Table 1. Yield, dry matter, and agronomic data of seven corn hybrids on farms in New Brunswick in 1981.

Farm	Hybrid	Yield	Dry Matter		Date of Planting	Plant Population	Stalk Breakage
		t/ha*	%	t/ha		(per ha)	(%)
1	1108	26.2	45	11.8	05 13	60,270	5
2	PX403	25.1	38	9.6	05 25	66,200	2
3	R097	20.2	37	9.1	05 20	50,000	5
4	3995	20.0	40	8.0	06 05	n/a	5
5	3957	28.4	24	6.7	06 05	n/a	45
6	3993	17.3	37	6.4	06 05	n/a	5
7	DK-22	15.3	33	5.1	05 20	65,700	2
8	3995	10.8	39	4.2	06 07	n/a	5
9	3993	12.0	34	4.1	06 07	n/a	5
	Mean	19.5	36	7.2			

*tonnes per hectare x .45 = tons per acre.

**plants per hectare x .40 = plants per acre.

The planting dates reported are approximate. Fields sampled were not the earliest planted on the farms. This again lowers the reported yield.

Plant populations, at those sites recorded, are in the recommended range. Stalk quality was good in all but the 3957. In this case, the incorrect plates were used in the planter giving an extremely high plant population and resulting poor stalk quality. Choice of a hybrid with good stalk quality is important to ensure that the crop is standing at harvest time.

High plant populations are not popular in North America and corn hybrids have not been bred for them.

CONCLUSIONS: Results reported are representative of late planted and harvested silage. The need to choose and plant adapted hybrids is demonstrated by the range of yields.

FORAGE QUALITY ON NEW BRUNSWICK FARMS

BY

K.J. MACISAAC AND S.G. CLARE[1]

Abstract: New Brunswick farmers submitted samples to two Soil and Crop Improvement Association forage competitions and also a Maritime Forage Competition. Results show forages grown on New Brunswick farms are improving in quality and holding their own on a Maritime comparison.

INTRODUCTION: The quality of forage used for livestock has long been a concern of New Brunswick farmers and agrologists. Improving forage quality has at least four basic advantages (Snoddon, 1981): increased protein content, increased energy content, increased voluntary intake and increased productivity per acre.

Increasing the amount of legume in the stand and early cutting are two of the most common practices used to improve forage quality. Unfortunately harvesting a legume forage in early June presents some difficulty. The crop is very immature and high in moisture, requiring excellent weather to dry. However, producers cannot afford to let the weather during a three week period of the year determine their feed quality for a two hundred day winter feeding period.

For hay producers, barn driers are an inexpensive way of cutting down field drying time and lessening the risk. For larger operations a haylage system is a logical answer to putting up large amounts of quality forage in a relatively short time.

Statistics indicate that only about twelve percent of the hay and haylage samples submitted to the Fredericton agricultural laboratory in 1980 and 1981 contained greater than fifteen percent protein.

To stimulate farmers to produce better quality forage than their fellow producers, the following forage competitions were held.

---

[1] Field Crops Specialist and Forage Specialist, respectively, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development

MATERIALS AND METHODS: The Kings County Soil and Crop Improvement Association forage competition was held in January 1981. Forty-five samples were submitted by growers. These were entered in five different classes - grass hay, legume hay, grass haylage, legume haylage and corn silage. Corn silage and haylage samples were ranked entirely in laboratory analysis. The following formulas were used:

Grass Haylage and Legume Haylage

(% protein on D.M. basis X 5) + (100 - ADF*) + % digestable protein.

*Acid Detergent Fibre

Corn Silage

(% D.M. X 3) + (% P on D.M. basis X 4).

The grass hay and legume hay were based on sixty percent for lab analysis and forty percent for visual analysis. The following formula was used:

Grass Hay and Legume Hay

(% protein on D.M. basis X 5) + (100 - ADF) + visual.

Plaques were awarded to first, second and third place winners in each class.

The Moncton Soil and Crop Improvement Association forage competition was held in February, 1981. Thirty-three samples were submitted by area members and entered in the following classes: First cut hay, second cut hay, first cut haylage, second cut haylage and corn silage. The same judging procedure was used. Haylage and corn silage were ranked on laboratory analysis only, but hay included visual analysis to the value of forty percent. Winners were also awarded plaques at the Association's annual meeting.

The Maritime Forage Competition was held in conjunction with the Atlantic Farm Mechanization Show in March, 1981. Samples were submitted by farmers from Prince Edward Island, Nova Scotia and New Brunswick. The feed testing laboratories in Prince Edward Island, Nova Scotia and New Brunswick analyzed samples of corn silage, haylage and hay respectively. Sixty-eight hay samples, approximately seventy haylage samples and approximately thirty corn silage samples were submitted by Maritime farmers. Samples were entered in the following classes: grass-legume hay, grass hay (less than 15% legume), legume hay (greater than 15% legume), grass haylage/silage (less than 20% legume), legume haylage/silage (greater than 20% legume) and corn silage. Three research scientists from Agriculture Canada were asked to judge samples basing forty percent of their score on visual analysis and sixty percent on chemical analysis. First, second and third place winners in each class were awarded plaques and prizes of one hundred dollars, sixty dollars and forty dollars, respectively.

RESULTS: Since classes were not identical in each competition, it was difficult to make direct comparisons. However, the following summaries are presented in Tables I, II and III.

Table I. Results of Kings County Soil & Crop Forage Competition.

	Average Protein	Protein Range	Average ADF	ADF Range	Average D.M.	D.M. Range
Grass haylage	12.2%	8.8-15.9	36.5	55.0-26.0	38.3	26.0-55.0
Legume haylage	15.8%	12.8-22.0	33.6	39.7-27.6	38.9	29.0-56.0
Grass hay	11.2%	6.6-14.5	35.8	41.0-31.0		
Legume hay	14.2%	9.7-19.1	35.8	39.7-32.0		
Corn silage	8.3%	7.3-9.5			28.4	26.0-31.0

Table II. Results of Moncton Soil & Crop Forage Competition.

	Average Protein	Protein Range	Average ADF	ADF Range	Average D.M.	D.M. Range
1st cut haylage	12.1%	9.5-14.1	40.0	44.8-36.7	32.7	24.0-42.0
2nd cut haylage	13.1%	10.5-15.8	38.6	42.1-34.9	36.0	29.0-48.0
1st cut hay	9.6%	8.9-11.6	38.0	43.0-32.7		
2nd cut hay	12.8%	8.2-16.3	36.1	42.8-29.6		
corn silage	8.1%	7.8-8.8			28.3	24.0-37.0

Table III. New Brunswick's placings in the Maritime Forage Competition.

	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Grass haylage-silage							x		x	
Legume haylage-silage			x	x			x		x	x
Grass hay				x	x					
Grass legume hay			x	x		x				x
Legume hay			x			x	x	x		x
Corn Silage	x	x		x	x	x	x			

OBSERVATIONS AND CONCLUSIONS: Average protein from all forages (excluding corn silage) was not high at approximately 12.6%. A protein range between 6.6 and 22.0 implies some excellent management and extremely poor management practices. Acid detergent fibre, a measure of digestability, influenced by cutting date, averaged 36.8%. This falls within the range of 33-38% indicating an early cut, highly digestible forage. Haylage dry matter averaged 36.5%. This could certainly be improved for tower silos, as 40% would be a more acceptable minimum. Corn silage dry matter averaged 28.4%, well within the acceptable range of 25:30%.

Finally, from Table III we see New Brunswick's standing on a Maritime comparison: An impressive 24 placings!

ACKNOWLEDGEMENTS: Snoddon, 1981, Forage Quality, Livestock and Poultry Newsletter, N.B. Department of Agriculture and Rural Development.

Thanks are extended to: The Feed Testing Lab in Fredericton, Murray Snoddon - Nutritionist, Paul Jensen - D.A. Moncton, John Monteith - Field Crops Technician, Plant Industry Branch and Bill Hurst and James Goit - Soils and Crop Specialists, Nova Scotia Department of Agriculture and Marketing.

FORAGE QUALITY FORECAST
1981 PROGRESS REPORT[1]

BY

R. E. McQUEEN[2]

Abstract: A Forage Quality Forecast was provided for farmers in central New Brunswick in 1981 to alert them to the current and anticipated nutritional quality of forage crops.

INTRODUCTION: Increasing the general farm awareness of forage quality and the necessity of cutting early will result in substantial savings in feed costs in New Brunswick. A modest improvement in forage quality obtained by cutting the crops at the optimum stage of maturity may result in reduced expenditures for cereal grain of $300,000 to $500,000 per year in this province.

The Forage Quality Forecast keeps farmers aware of the changing nutritional quality of forage crops through the growing season. The immediacy of the information catches the attention of producers and is a useful extension tool. Each forecast period was ten days with predicted quality indexes given for three to four day intervals. The forecast was updated weekly from early June through to the third week in July.

The forecast gave information on two timothy cultivars: Toro, early; Climax, mid-season; and for alfalfa and red clover. This information included the anticipated stage of maturity and nutrient digestibility for each crop for the three to four day intervals in each forecast period. The stages of maturity enabled farmers to compare their own crops relative to those monitored for the forecast. Consequently, farmers could make adjustments for regional or local variation.

The predictions were made by monitoring standard crops at the Fredericton Research Station. Samples were

---

[1] Financially supported by Agriculture Canada, Research Branch, Fredericton, New Brunswick in 1981. In 1979 and 1980, N. B. Department of Agriculture and Rural Development gave financial support.

[2] Research Scientist, Agriculture Canada Research Station, Fredericton, New Brunswick.

taken weekly and subjected to laboratory analysis. The analyses used were the most accurate available (rumen *in vitro* fermentation). Other chemical analyses were also done so that future programs can be based on simpler methods. The long-range weather forecast was used so that growth trends of the crops could be predicted. Data collected in previous years was used as a basis for comparison.

The forecast information was given over two radio stations (CBC-Farm News-noon - two to three times weekly; and CFNB-early morning program - twice weekly). It was also published in the Fredericton Daily Gleaner on the Farm News page each Wednesday. We did not offer a toll-free code-a-phone service in 1981 because the weather forecast information was given over a dedicated radio frequency from Moncton. Without it, we did not think that many farmers would use the service. Farmers were alerted to the forecast service in early summer by mail, radio and the Daily Gleaner. In future, it would be an improvement if the Forage Forecast was also available over the dedicated radio frequency with the weather forecast and hay drying index.

Based on personal contact with farmers and extension workers, the newspaper and radio services were well-received by farmers. By keeping this sort of information in front of farmers, there is a better chance that they will note it. Our past experience with direct mailings indicated that often the material was not read.

A questionnaire is again being sent to farmers to solicit their reactions to the forecast program in 1981. However, the replies are not available at the time of writing this summary.

There has been considerable interest in this program expressed by forage crops experts in other parts of Canada and the United States.

A service such as the Forage Quality Forecast is only one part of an integrated program needed to improve the nutritional quality of forage in this Province. Soil and Crop Associations, educating producers and research on forage crop management, conservation and feeding all make vital contributions.

ACKNOWLEDGEMENT: The encouragement and co-operation of Stephen Clare, N. B. Department of Agriculture, is gratefully acknowledged.

FORAGE YIELD SURVEY
PERENNIAL CROPS
PRELIMINARY REPORT

S. G. CLARE AND K. J. MACISAAC[1]

Abstract: Results of on-farm yield surveys of 1981 are reported. Aims of the program in the coming year are discussed.

INTRODUCTION: Previous surveys of on-farm yields (Clare and MacIsaac, 1980) have reported on forage crop yields on a single year basis. To establish the productivity of a perennial forage crop, the yield must be monitored for the productive life of the stand. The yield survey for 1981 is the start of such an effort.

METHODS: Farms have been selected to represent several soil types present in the Province. Yield data (Table I) have been recorded for the first year of production. We will be taking yield data for the life of the stand and will be working with Farm Management, Engineering and Soils Specialists to monitor management practices and cost of production.

This information will be used to assist the yield predictions on differing soils and cost estimates under several management and harvesting systems practiced on New Brunswick farms.

Yields were established by weighing forage yield at time of harvest. Forage and soil samples were taken for laboratory analyses.

RESULTS AND DISCUSSION: Farms 1 and 2 established alfalfa in 1981. Due to the good growing season, two cuts were taken. Both farmers planted alfalfa but farmer 2 included a light seeding of cereal resulting in lower protein and high acid digestible fibre (ADF) for the first cut. Farms 3, 4 and 5 established the crop in 1980.

---

[1] Forage Crop Specialist and Field Crop Specialist, respectively, New Brunswick Department of Agriculture and Rural Development.

Differences in yield and nutrient results from differences in management practices and site. A full discussion of the sites and the management will come as information is accumulated.

REFERENCES: Clare, S.G. and K.J. MacIsaac. Forage Yield Survey 1980 - Perennial Crops. Adaptive Research Reports. New Brunswick Department of Agriculture and Rural Development. 1981.

TABLE I. YIELD AND NUTRIENT COMPOSITION OF FORAGE CROPS BY CUT DURING THE FIRST YEAR OF PRODUCTION IN NEW BRUNSWICK IN 1981

FARM	CUT	DATE	YIELD	% D.M.	% PROTEIN	% TDN	ADF
1	1	07 17	3.8	38	17.8	.48	23
	2	08 29	6.0	39	22.1	.69	30
2	1	07 24	11.2	37	12.9	.61	34
	2	08 29	3.3	55	22.9	.70	26
3	1	06 19	7.6	42	10.3	.57	37
	2	08 25	10.7	41	15.4	.63	33
4	1	06 19	34.4	20	20.0	.63	32
	2	08 12	11.6	26	15.8	.65	30
5	1	06 30	12.9	31	12.7	.60	34
	2	08 20	6.9	40	16.8	.61	34

TABLE II. YIELD AND NUTRIENT PRODUCTION OF FORAGE CROPS DURING THE FIRST HARVEST YEAR IN NEW BRUNSWICK IN 1981

FARM	YEAR OF ESTABLISHMENT	YIELD (WET)	TONNES/HECTARE-DRY MATTER YIELD	TONNES/HECTARE-DRY MATTER PROTEIN	TONNES/HECTARE-DRY MATTER TDN
1	1980	9.8	3.80	.76	2.61
2	1980	14.5	6.03	.96	3.88
3	1981	18.3	7.61	1.00	4.60
4	1981	46.0	10.14	1.85	6.30
5	1981	20.0	6.83	.98	4.17
Mean			6.88	1.11	4.31

DEMONSTRATION OF CONTROL OF SMOOTH BEDSTRAW (GALIUM MOLLUGO L.) IN TIMOTHY

BY

D. J. DOOHAN[1]

Abstract: Mecoprop at 1 kg/ha was demonstrated for control of smooth bedstraw in timothy. It gave 80% control of bedstraw and a several fold increase in the timothy stand.

INTRODUCTION: Over the last several years, smooth bedstraw has been infesting on increasing number of acres of improved and unimproved grassland (Doohan, 1980). In timothy, smooth bedstraw competition has been observed to eliminate 80-90% of the grass sward. No connection between smooth bedstraw infestation and environmental or soil conditions has yet been proven. Observation indicates that not plowing fields routinely may facilitate infestation.

The herbicides picloram, trichlopyr, hexazinone, glyphosate and mecoprop have all been reported effective against bedstraw (Doohan, 1980), (Huston, 1978) and (Thompson, 1980). Of these herbicides, only mecoprop is registered for use as an overall spray on established grassland. Glyphosate would be useful only to eradicate growing bedstraw prior to soil preparation. Hexazinone caused injury to the timothy. Picloram and trichlopyr are unlikely to be registered due to soil residue problems.

MATERIALS AND METHODS: It was decided in 1981 to put emphasis on mecoprop as it appeared to be the only herbicide that could be recommended to growers. One trial was established to compare mecoprop with picloram and trichlopyr and three demonstrations of mecoprop for bedstraw control were planned.

---

[1] Weed Specialist, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

Comparison of Mecoprop, Picloram and Trichlopyr

On May 27 at Cornhill, Kings County, mecoprop 1.0 kg/ha, picloram 0.25 kg/ha and trichlopyr 1.0 kg/ha were each applied in a single 2 m x 30 m strip in a field of timothy heavily infested with bedstraw in the early bloom stage. The timothy stand appeared to be reduced by about 95% as a result of bedstraw competition.

Demonstration of Mecoprop For Bedstraw Control

Of the three demonstrations planned, two were not completed as the farmer co-operator could not work it into their busy summer schedule. The one demonstration conducted was in Kent County. Mecoprop 1 kg/ha was applied to the first of two, three acre blocks of bedstraw-infested land in early July and to the second in mid-August.

RESULTS AND DISCUSSION:

Comparison of Mecoprop, Picloram and Trichlopyr

At 1 kg/ha mecoprop gave about 75% control of bedstraw whereas picloram and trichlopyr gave about 95% control. All three treatments resulted in a several fold increase in the stand of timothy. The mecoprop treatment at 1 kg/ha appears to be acceptable at present; however, the duration of the control will bear significantly on its long term acceptance by growers.

Demonstration of Mecoprop For Bedstraw Control

Mecoprop at 1 kg/ha applied in early July had controlled 75-80% of the bedstraw as of September 29, 1981. In this demonstration, the timothy, when compared to the untreated area, responded very well and the stand went from nil to a fair stand just as a result of weed control.

When the same rate of mecoprop was applied in mid-August, poor control of bedstraw resulted (less than 30%) and the timothy did not respond to the treatment.

CONCLUSION: Although picloram and trichlopyr hold promise of future use in controlling bedstraw, at present the only herbicide that can be recommended, with caution, is mecoprop. Mecoprop at 1 kg/ha is a registered treatment that should be considered for grasslands heavily infested with bedstraw. Growers should realize this treatment can be very dangerous to forage legumes.

ACKNOWLEDGEMENTS: The assistance of Kevin MacIsaac, Area Field Crop Specialist, is gratefully appreciated.

REFERENCES: Doohan, D.J. 1980. Control of Smooth Bedstraw in Timothy. Expert Committee on Weeds, Eastern Section, Research Report. p. 32.

Huston, F. 1978. Herbicides For Control of Bedstraw. Expert Committee on Weeds, Eastern Section, Research Report. p. 303.

Thompson, J. 1980. Personal communication.

APPLICATION OF METEOROLOGICAL DATA IN PREDICTING HARVESTING DATE FOR APPLES AND STRAWBERRIES AND INSECT APPEARANCE[1]

G. S. READ AND C. R. MURRAY[2]

Abstract: An intensive biological data base was set up to evaluate several predictive techniques for fruit producers using selected meteorological data. Specific applications included: prediction of the dates of harvest in strawberries and apples, and prediction of dates of appearance of several apple insects. Results in most cases were very good with a lead time of two to three weeks. The potential exists for expanding the program to cover all the provincial fruit growing areas.

INTRODUCTION: This is the second year of applying this research from southern Ontario to our New Brunswick conditions. A detailed program monitoring crop maturity and insect activity was set up from Jemseg to Keswick. The results were evaluated using meteorological data from the Fredericton Agriculture Research Station and the Fredericton Airport.

The dates of first commercial harvest of strawberries for cultivars Veestar and Redcoat were predicated. Data on eight additional cultivars were recorded for future rating in terms of meteorological criteria.

Insect monitoring was based upon data obtained from over 100 insect traps checked on average, three times weekly and often daily at times of predicted peak activity. Trapping data for 5 additional apple pests were recorded and one insect in blueberries.[3]

---

[1] Financially supported by Technology Transfer Program, A.S.A. II.

[2] Climatology Technician and Summer Student, New Brunswick Department of Agriculture and Rural Development.

[3] Insect traps were located through the co-operation of local orchardists. Strawberry monitoring through the co-operation of D'Aoust Farms.

RESULTS: (1) Dates of First Commercial Harvest of Strawberries.

A prediction technique based upon degree days and hours of bright sunshine developed in Vineland, Ontario, Trottier (1976) was modified from the previous year and applied to the test area. Predictions commenced up to five (5) weeks prior to actual harvest, and were continually updated as the harvest approached. (See Table I).

(2) Date of Harvest of McIntosh Apples

A technique developed in Maine by Eggert (1960) was used to estimate the date of maturity in McIntosh. (See Table II).

(3) Dates of Appearance of Four (4) Apple Insects.

Based upon various degree day techniques, several years of local apple maggot trap data were correlated with meteorological data in a modification of an established technique used in Ontario. This modification provided a much better prediction. European Red Mite, Tentiform Leaf Miner and Codling Moth appearance dates were calculated using a heat unit technique developed by Trottier (1975) in Vineland, Ontario.

TABLE I

Prediction of Date of First Commercial Harvest of Strawberries Issued May 28, 1981

Cultivar	Predicted	Observed
Veestar	June 23	June 23
Redcoat	June 27	June 27-28

TABLE II

Prediction of the First Acceptable Date of Physiological Maturity of McIntosh Apples

Cultivar	Predicted	Observed
McIntosh	Sept. 27	Sept. 22

TABLE III

Prediction of First Appearance Dates of Four Apple Insects Approx. 2-3 Weeks Prior, and One Blueberry Insect

Species	Predicted	Observed
European Red Mite	May 13	May 13
Tentiform Leaf Miner	*	*
Codling Moth	June 3	June 3
Apple Maggot**	June 28-29	June 29
Blueberry Maggot**	June 29-30	July 3

In all cases, the observed values were more than one week earlier than expected normally.

CONCLUSIONS: This is the third year this technique was applied to N.B. grown strawberries. This year by starting to accumulate heat units earlier, the prediction was found to be more accurate.

Where sunshine data is available, the technique is ready to be extended to cover the strawberry producing areas of the Province.

Furthermore, the prediction of strawberry maturity 3-4 weeks prior to the date of first commercial harvest can be extended from this study area to all the strawberry producing areas of the Province. This will provide a valuable tool in managing and scheduling harvest operations and developing an orderly market structure.

The predictive techniques for insects demonstrated in this trial provided reasonably accurate forecasts of activity. In some cases, predictions were within one day of the observed appearance.

This prediction will provide growers with a date to begin monitoring and control measures. As evidenced in the last three seasons, insect activity was one week to 10 days earlier than what is normally expected for this area. The consequence of applying a control operation being unaware of this advanced activity is an ineffective insect control program.

The evaluation of two years of data in apple maturity prediction, have not shown an accuracy comparable to strawberries. This area needs more research to modify the existing technique.

* insect already present at time of trapping
**prediction based upon 14 years of local data

The results of this trial show that weather data can be used to provide reasonably accurate predictions of the date of fruit crop maturity and insect appearance, and that the accuracy can likely be improved by local evaluations.

ACKNOWLEDGEMENT: Special acknowledgement goes to Dave Finnamore, Entomologist, Plant Industry Branch, for providing his entomological expertise and trapping results, and to Paul Smith, the originator of the project.

REFERENCES: Trottier, R. 1975. A Warning System for Pests in Apple Orchards. Reprinted from "Canada Agriculture", Winter, 1975.

Trottier, R. 1976. Predicting Date of First Commercial Pick of Strawberries and Peaches in Ontario. Taken from "Information for Extension Personnel", Agdex No. $\frac{232}{50}$.

Eggert, F.P. 1960. The Relation Between Heat Unit Accumulation and Length of Time Required to Mature McIntosh Apples in Maine. American Society for Horticultural Science, Vol. 76, p. 98-105.

CLIMATIC MONITORING AT CROP DEMONSTRATION TRIALS

BY

G. S. READ[1]

Abstract: Weather conditions during the 1981 growing season were monitored at several crop demonstration trials in various locations in New Brunswick.

INTRODUCTION: Crop production is strongly influenced by the nature of the weather during the growing season, as a result, any interpretation of the results obtained in field trials, either between years, locations or cultivars, must have reliable weather data available.

RESULTS: In 1981, there were 34 climate stations operating under the climate unit supervision. This year, the principal areas of concentration were vegetables, blueberries, tobacco, soybeans and potatoes.

Maximum and minimum temperatures were recorded on thermographs housed in Stevenson screens, and checked by thermometers.

The following list identifies the station, its location, the cooperator looking after the stations and the commodity involved.

Station	County	Cooperator	Commodity
Sussex	Kings	G. Read	Corn
Florenceville (2)	Carleton	R. Parry	Soybean, Grain, Potatoes
Bernard	Kent	J. Wade	Tobacco
Cap Pele	Westmorland	J. Wade	Tobacco
Tower Hill	Charlotte	G. Wood	Blueberry
Edmundston (2)	Madawaska	L. Potato	Potato

---

[1] Climatology Technician, Plant Industry Branch, New Brunswick Department of Agriculture and Rural Development.

Station	County	Cooperator	Commodity
Grand Falls(2)	Victoria	E. Cote	Potato
Arthurette (2)	Victoria	B. DeMerchant	Potato
Aroostook (2)	Victoria	D. MacLaughlin	Potato
Woodstock (2)	Carleton	H. Keenan	Potato
Neguac	Gloucester	G. Chiasson	Blueberry
Brantville	Gloucester	G. Chiasson	Blueberry
Daley	Gloucester	R. Theriault	Soybean
St. Sauveur	Gloucester	G. Chiasson	Blueberry
Tilley Road	Gloucester	G. Chiasson	Blueberry
Everett	York	G. Read	Apples
Finnigan	Kent	M. LeBlanc	Beans
Harveys (2)	York	K. Harvey	Potato
Cails	Kent	L. Cail	Beans
Coburn	York	J. Coburn	Apples
Klearbright (3)	York	R. Alward	Apples
Sheila	Gloucester	G. Losier	Blueberry
King	Kent	M. LeBlanc	Beans
Maillet	Kent	C. Murray	Beans

CONCLUSIONS: Weather data were collected at 34 climate locations for the 1981 growing season, primarily for use in analysis of crop performance, for evaluating disease conditions, and for use in predictive techniques for crop and insect development.

IMPROVEMENT OF SOIL PHYSICAL PROPERTIES BY THE BREAKUP OF TILLABLE PANS[1]

JOHN K. MAC MILLAN[2]

Abstract: Two sites, each with a different type of tillable pan, were selected for deep tillage trials. These sites were tilled and monitored for improvement in trafficability and crop yield.

INTRODUCTION: Tillable pans, i.e. pans within 60 cm of the soil surface, occur in many New Brunswick soils These pans vary in thickness and in the depth from the surface at which they occur. These are distinguished from compact lodgement till soils in that the lodgement till soils extend beyond the 60 cm depth and are continuous.

The pans restrict vertical water movement in the soil and the rooting depth of the crops. As a result during periods of high rainfall the soil above pans become saturated delaying seeding or harvest due to poor trafficability and/or poor growth due to the effects of excess moisture. In dry periods, the soil above the pans tends to dry out and in many cases a lack of sufficient available water for healthy plant growth results. This combination of conditions over the growing season tends to limit the range of crops that can be grown and reduces the yield of the crops that are grown.

Breaking the pans will allow moisture to move vertically in the profile. This will increase available moisture by allowing water to be stored in the soil below the pans. The plant rooting zone will be increased and this along with the improved trafficability will allow a wider range of crops to be grown as well as increased yields.

It must be recognized that the degree of improvement will depend on the type of pan condition that exists as well as the physical characteristics of the soil beneath pans.

---

[1] Financially supported by Technology Transfer Program, A.S.A. II.

[2] Soil Surveyor, N.B. Department of Agriculture and Rural Development.

METHODS: Two of the three sites for deep tillage trials in 1980 were tilled in 1981. The third was dropped due to the difficulty in getting the proper weather and soil moisture conditions for deep tillage.

Site 1 was on the Thilium Farm in the Murray Corner-Shemogue area. The soil was an imperfectly to poorly drained Tormentine series on the lower slopes and a moderately to imperfectly drained Tormentine on the higher ground. The slope was 5% to the northeast levelling off to a 1% slope to the east and northwest. Seepage water was coming from the forested areas to the south and west and collecting in the lower portion of the field (Figure 1). The soil was a fine sandy loam to very fine sandy clay loam with a high bulk density below 20 cm. There were places where sand lenses of varying thickness were encountered at various depths, but there was no consistency in the pattern. The field had been plowed in 1980 and was deep tilled in August of 1981 with a three tined tiller with tine spacing of 1 m. Conditions for tilling were not ideal, but were the best that existed all season.

Site 2 was on the farm of Joerg Von Waldo in Cornhill East. The site was located near the bottom of a long slope. The topography was nearly level and a large ditch had been dug at the bottom of the site. The site originally was probably part of a cedar swamp. It was poorly drained and gleyed, except for a 25 cm layer of well decomposed organic matter on the surface. Moving away from the ditch the soil graded into a moderately well drained sandy clay loam with a moderately high bulk density and fair structure. The deep tillage trial was confined to the poorly to imperfectly drained area. Beneath the organic layer was a 10-15 cm layer of plastic clay and silt which appears to have formed as a result of siltation. Beneath this was gleyed gravelly loam which varied from 30 to 60 cm. In all horizons, they graded into the clay loam till. Soil samples were taken at 8 sites within the plot to a depth of 90 cm where possible. pH, P_2O_5, K_2O, Ca and Mg were determined on the samples.as well as sand fractions, silt, clay, O.M. and erodibility factors. A sketch of the plot and the sample locations are shown in Figure 2. The plot was deep tilled with a single tine deep tiller to a depth of 60-70 cm with the rips approximately 2 m apart.

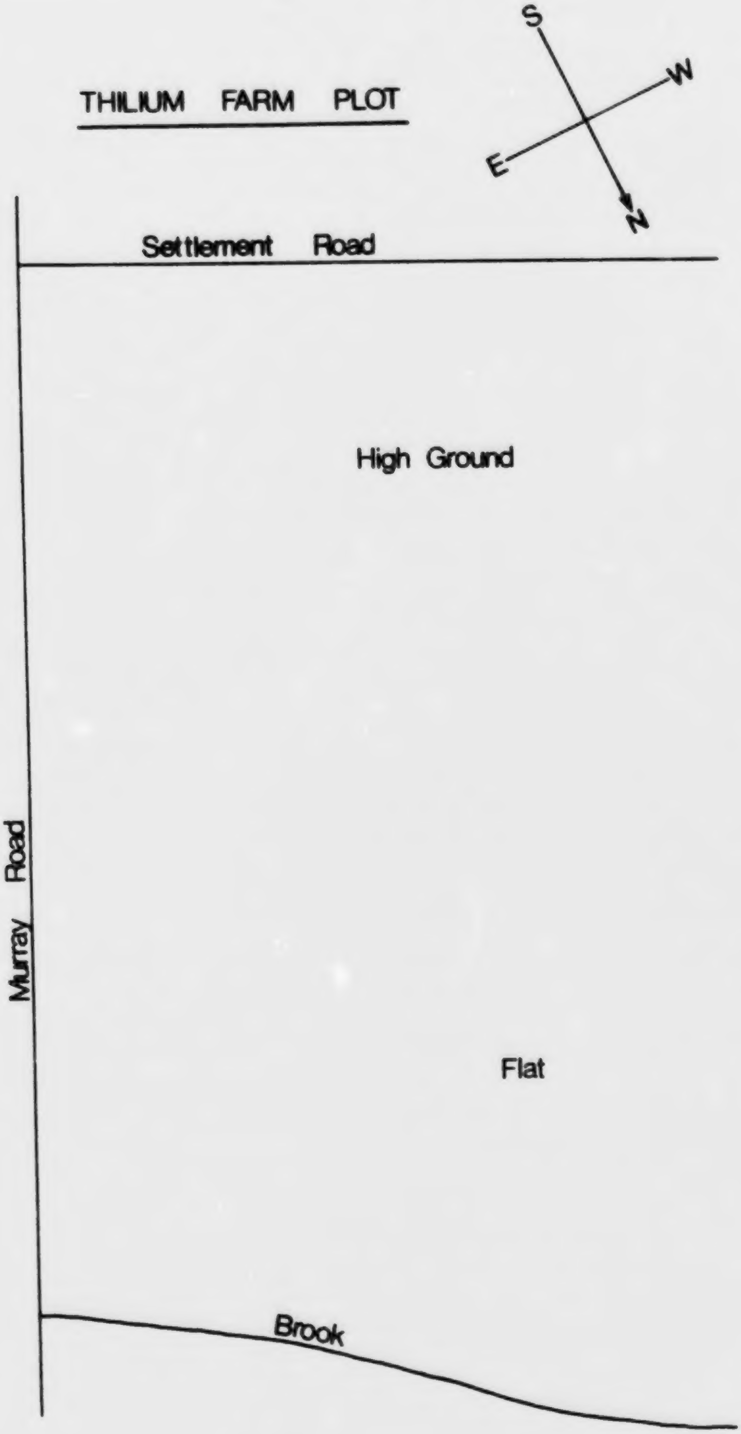

THILIUM FARM PLOT
S
W
E
N
Settlement Road
High Ground
Murray Road
Flat
Brook

FIGURE 1

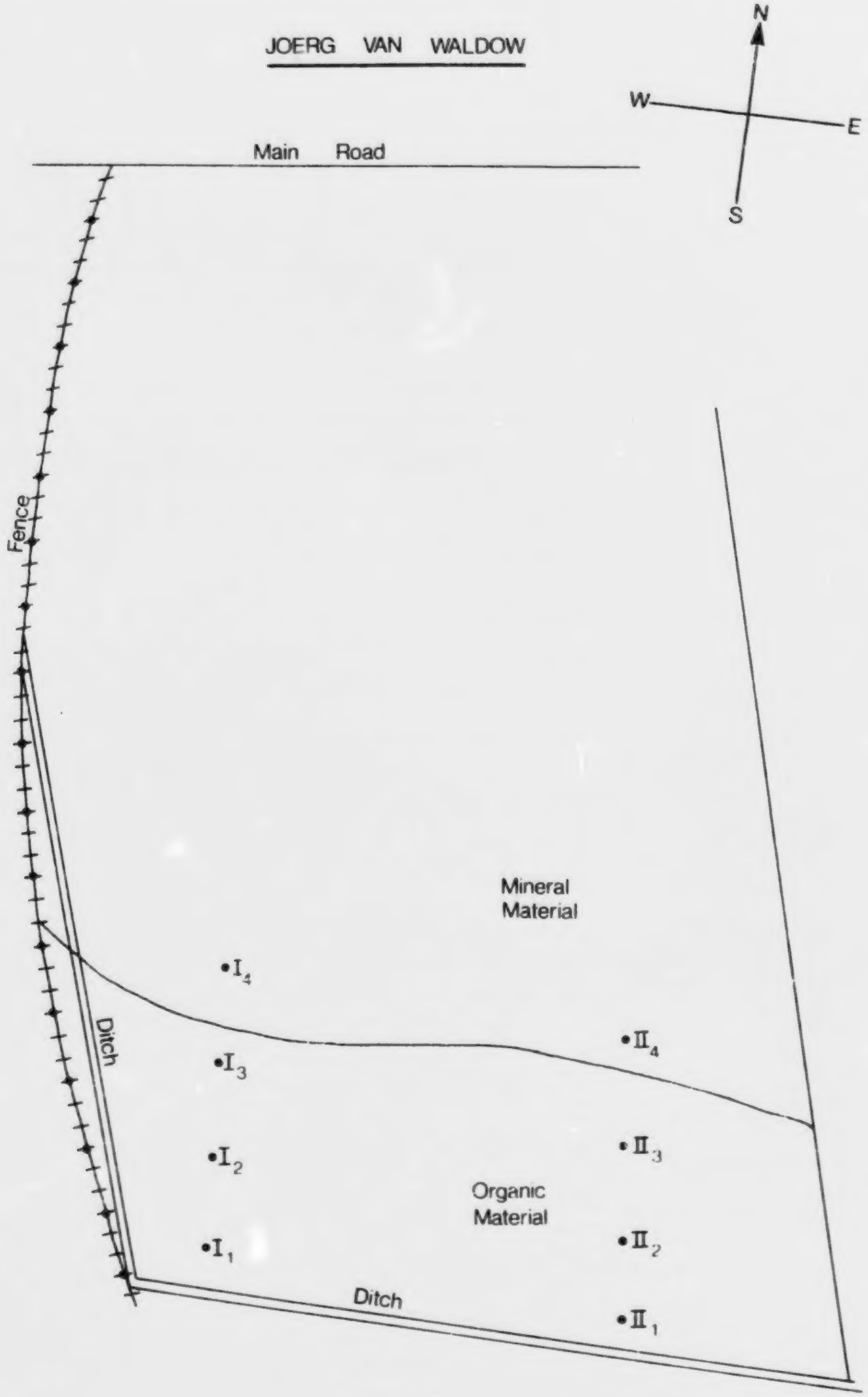

JOERG VAN WALDOW
N
W
E
S
Main Road
Fence
Ditch
Mineral Material
•I4
•I3
•I2
•I1
•II4
•II3
•II2
•II1
Organic Material
Ditch

FIGURE 2

RESULTS AND DISCUSSIONS: The two sites were checked in mid October. Site 1 showed no visible signs of improved drainage and in the lower portions water was collecting on the soil surface in places and the water table was near the surface in the rest of the lower area. While the higher areas were not so wet there were no definite indications that deep tillage had helped.

While deep tillage was not expected to solve the problems on this plot alone, improvement was expected and it is too soon to expect many results considering the amount of rainfall in the area this past season. This fact plus the large amount of seepage water would require deep tillage in conjunction with other soil improvement practices to solve the soil problems caused by excessive water. With this site a deep ditch along the road on the south side to the main road ditches along the main road and a deep ditch along the north side of the property combined with deep tillage perpendicular to the ditches allow management of the field over the whole growing season.

Site 2 did show improvement and in October, while after a heavy rain, there were some small puddles on the surface. The improvement was noticeable and the sweet clover that was seeded after the deep tillage operation was growing very well and did not appear to be restricted by excessive water problems. At this site a ditch was in place before the tillage was done which added greatly to the effectiveness of the deep tillage.

CONCLUSIONS: Deep tillage can be used to improve certain soils physical conditions that limit the range and yield of crops. Deeper rooting zones, better aeration and improved water holding capacity are possible as a result of deep tillage. The best results would be obtained with deep tillage in conjunction with other measures such as tile and mole drainage, ditching, incorporation of humus or organic matter and the use of deep rooted crops as soil conditioners. In conjuction with these other measures deep tillage would provide benefits on a much wider range of soil conditions.

SWEET CLOVER AS A SOIL CONDITIONER

JOHN K. MACMILLAN[1]

Abstract: Three sites each with different properties were selected for seeding with biennial sweet clover in order to determine the potential of this crop as a soil conditioner.

INTRODUCTION: Many soils in New Brunswick have physical properties that limit the range and yield of crops that can be grown. Soils with poor structure, high bulk density or pans have restricted water movement and low porosity which restricts the rooting zone, reduces trafficability and delays spring warm up. In some cases conditions are such that plant water stress occurs later in the season due to lack of available water storage.

The properties named can be improved by deep tilling to break up dense horizons or pans or by incorporating organic matter to reduce the bulk density. The latter can be done mechanically or it can be done with a deep rooted crop that will penetrate the dense material and provide humus and water channels when they decay. If deep tillage and the cropping techniques were used together the plant roots would penetrate more easily and prolong the effect of the deep tillage. A deep rooted crop would also transfer nutrients from lower depths that would be available for the crops following in the rotation.

Sweet clover is considered one of the better crops to use as a soil conditioner. It has a wide branching deep penetrating tap root. It is a legume with good top growth which decays rapidly when plowed down at the right time. Sweet clover does tolerate a wide range of soil conditions and seems to adapt more readily than many other crops.

---

[1] Soil Surveyor, N.B. Department of Agriculture & Rural Development

METHODS: Two of the sites chosen for seeding to sweet clover were also used for deep tillage research. The third site was a lacustrine soil which was not tilled and was seeded to grain.

Site 1 was located on Thilium Farms property on the Murray Corner - Highway 16 road. The site had a 5% slope to the north east grading to a 1% slope east and north west. The soil was a fine to very fine sandy clay loam with a higher clay content on the lesser slope. Most of the excess water appeared to come from wooded area to the south of the field which seeped down grade and built up in the lower portions of the field. The field was deep tilled then roto tilled and seeded to sweet clover in early August.

Site 2 was located in Cornhill East on Joerg Von Waldo,s farm. The soil was poorly drained with 25 cm of organic matter over 10-15 cm of plastic clay. Beneath this the soil was a gleyed gravelly loam. The pH was 7.0 or higher throughout. The site was seeded to sweet clover in early June.

Site 3 was in the Drummond area. The soil was the Bellefleur Series which is a fine,stone free lacustrine deposit with laminated structure and very compact. The pH range was between 6.0 and 7.0 from the surface to a depth of 100 cm. This plot was seeded to sweet clover in mid-June. In this case the seed was spread on the surface using a hand seeder.

The plots were checked intermittenly through the summer with the final check made in mid October.

RESULTS AND DISCUSSIONS: In Site 1 nc sweet clover was found although there had been some growth earlier. Since I was not present when it was seeded the reasons for such poor performance are not certain. It was very wet in the area and in October the site had the water table within a few inches of the surface. It would seem that a combination of poor drainage and seeding errors were responsible for the poor catch of sweet clover and at this site the results are inconclusive.

At Site 2 the results varied. In part of the plot the stand was excellent when checked in October. In the remainder the stand varied from poor to fair. In both cases growth was good with root penetration to a maximum of 25 cm. Crown buds had formed indicating good potential growth next season,depending on winter conditions. The areas where the stands are poor is probably due to problems encountered at seeding time with mud affecting the spreading of the seed and this will be checked further.

Site 3 was checked more often than the other sites during the summer. The seed did sprout but many sprouts were killed by hot dry weather. Those that were in soil cracks or covered by soil washed over by rain survived. The field was seeded to grain. When checked in October there was still a fair catch but growth was poor which probably is due to the competition from the grain. The roots were penetrating the soil and in some cases were down 10 cm. It is recommended that sweet clover be plowed down early in the second year. With the three plots described above it is planned to delay the plowing one more year to see how the sweet clover performs the second year, and what effect winter conditions will have.

CONCLUSIONS: Sweet clover does seem to have a potential use as a soil conditioner for N.B. soils. There are some questions on management and the range of soil conditions necessary to obtain suitable stands and some work will be started next season to find answers to these questions.

MINERAL CONTENT OF SOILS IN THE BELLEDUNE AREA

BY

JOHN K. MACMILLAN[1]

Abstract: Soil samples have been collected periodically since 1966 from sites in the vicinity of the Belledune smelter. The mineral content was determined for a number of the minerals expected in base mineral mining and smelting operations.

INTRODUCTION: Prior to the start up of the lead zinc smelter in Belledune a number of meetings concerned with smelter fumes were held. These meetings were attended by staff members from various provincial and federal government departments and consulting engineers concerned with the effects of such fumes on the environment. As a result of these meetings K.K. Langmaid and myself both with the N.B. Soil Survey of Agriculture Canada selected eight sites (Fig. 1) in 1966. These sites were at various distances and different directions from the smelter. Originally it was intended to sample these plots in 1966, 1970 and every five years thereafter. Due to staff changes this schedule was not kept, however, samples were taken in 1966, 1967, 1975 and 1980. The objectives of the study were to determine what elements were being deposited, what the effect of distance and direction woud be on the amount of deposition and would the accumulated deposition reach toxic levels over a period of years.

METHODS: The plots were located at distances of 7, 15, 27, 30 and 43 km surrounding the smelter site. The plots were approximately 2 m by 1 m in size and were located in cleared areas with one exception where the site was in a location reverting to forest. Efforts were made to locate the plots where they would receive a minimum of disturbance ie along fence rows. Samples were taken to a depth of 15 cm using a one inch tube type soil sampler. Cores were collected at random over the plot surface, mixed and a composite sample

---

[1] Soil Surveyor, N.B. Department of Agriculture and Rural Development.

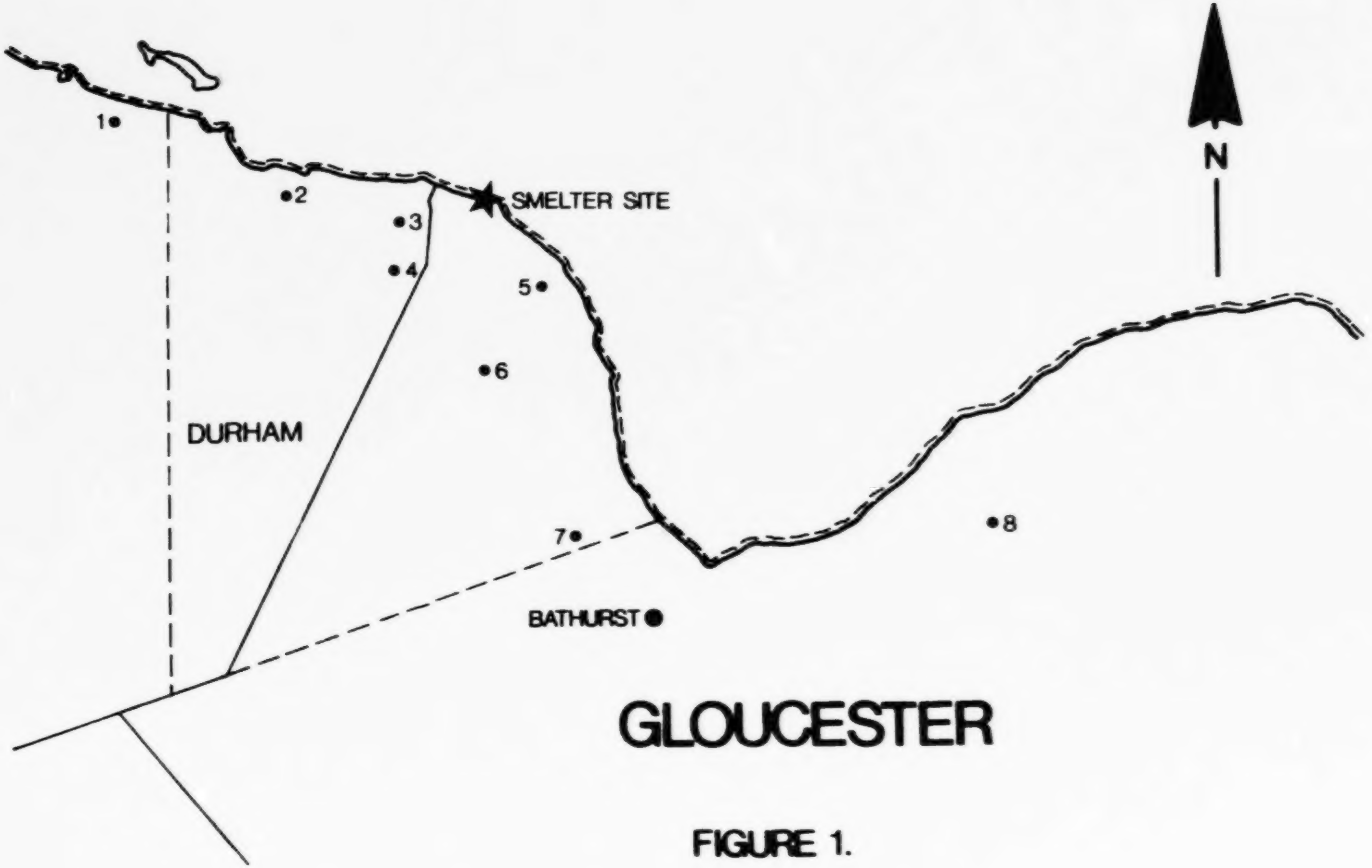

N
1
2
3
4
SMELTER SITE
5
6
DURHAM
7
8
BATHURST
GLOUCESTER

FIGURE 1.

	ppm								%			
	Cu	Zn	Mn	Co	Li	Cr	Ni	Pb	Al	Fe	Mg	Ca
Site 1 30 km	Black Land WNW											
1967	65.5	90.0	662.5	19.0	17.5	94.0	34.0	8.0	6.05	3.55	0.81	0.49
1975	17.5	80.5	470.0	17.0	20.5	95.0	32.0	10.5	6.03	2.85	0.71	0.37
1980	20.0	27.0	470.0	22.5	24.0	100.0	39.6	17.6	6.85	3.51	0.84	0.25
Site 2 15 km	Nash Creek W											
1967	22.5	145.0	560.0	16.5	14.5	62.5	20.0	19.6	5.80	4.06	0.70	0.41
1975	23.5	217.5	1135.0	21.0	21.0	67.5	27.5	24.0	6.63	4.05	0.90	0.56
1980	25.0	295.0	505.0	18.5	17.5	62.0	30.0	30.6	6.15	4.25	0.77	0.39
Site 3 10 km	New Colony WSW											
1966	17.0	92.0	1055.0	11.0	8.0	54.0	11.5	11.5	3.81	2.53	0.29	0.31
1967	21.5	56.5	545.0	7.0	7.5	57.5	8.5	8.0	3.49	1.94	0.27	0.24
1975	18.0	87.5	675.0	11.0	12.0	56.5	15.0	18.0	4.08	2.80	0.35	0.26
1980	21.5	112.5	615.0	19.0	14.0	70.5	20.0	16.0	5.63	4.48	0.53	0.27
Site 4 7 km	Culligans WNW											
1966	25.0	77.8	2480.0	28.5	21.5	110.0	65.0	10.5	6.41	4.25	1.20	0.56
1967	32.0	91.0	2100.0	24.0	17.5	115.0	65.5	10.5	6.64	3.31	1.23	1.22
1975	31.0	120.0	1890.0	23.5	20.5	111.0	67.0	31.3	6.33	4.36	1.19	0.64
1980	35.5	115.0	2020.0	27.0	18.0	107.0	66.5	29.9	6.46	5.00	1.16	0.63
Site 5 7 km	Green Pointe ESE											
1966	29.0	77.8	455.0	21.0	18.0	119.0	19.0	11.5	6.26	4.09	0.82	0.34
1967	32.5	85.0	425.0	19.0	19.0	110.0	9.6	9.6	5.98	3.98	0.79	0.38
1975	38.5	227.5	1410.0	23.0	28.0	122.0	38.5	25.0	6.55	4.45	0.93	1.01
1980	31.0	112.5	430.0	20.0	20.0	120.0	31.5	23.3	5.86	3.90	0.75	0.47
Site 6 15 km	Alcida SSW											
1966	17.0	80.0	700.0	15.0	12.0	87.5	15.0	11.5	5.64	2.45	0.51	0.63
1967	18.0	83.0	665.0	15.0	12.0	69.5	15.5	12.5	5.38	4.11	0.54	1.47
1975	21.0	110.0	772.5	19.0	19.0	75.0	25.5	14.0	6.31	3.06	0.73	0.71
1980	20.0	96.0	530.0	17.0	21.0	72.5	30.0	11.8	6.09	2.98	0.74	0.59
Site 7 27 km	Dunlop SSE											
1966	26.0	110.0	2090.0	25.0	14.0	80.5	15.0	11.5	6.44	4.44	0.89	0.60
1967	26.0	127.5	2070.0	21.0	17.0	78.5	24.0	13.0	6.11	4.11	0.83	0.63
1975	27.0	130.0	2825.0	22.0	18.0	78.0	31.0	14.0	6.25	4.18	0.83	0.71
1980	24.0	112.5	1460.0	20.5	18.0	82.5	20.0	13.0	6.04	4.15	0.83	1.06
Site 8 43 km	Canobie ESE											
1966	13.0	60.0	1355.0	10.5	11.0	33.0	9.5	8.0	3.81	1.58	0.24	0.24
1967	12.0	46.5	1155.0	7.5	7.5	34.0	7.5	9.0	3.76	1.35	0.26	0.27
1975	13.5	49.0	975.0	10.0	11.5	32.5	11.4	8.5	3.80	1.63	0.25	0.25
1980	14.0	45.5	605.0	10.0	[illegible]	40.0	10.0	14.5	4.10	1.79	0.27	0.19

Table 1

taken for analysis. The samples were analyzed by the[2] Soil Classification Section of the Land Resource Research Institute, Agriculture Canada for total Cu, Zn, Mn, Co, Li, Cr, Ni, Pb, Al, Fe, Mg, Ca, Mo and Cd.

RESULTS AND DISCUSSION: The results for the analysis completed so far are shown in Table 1. Cadmium and molyldenum analysis were completed as well but in all samples were below 0.3 ppm and are not shown in the table. Sulphur arsenic and pH determinations are being done at present. Since the data is incomplete no definite conclusions can be made at this time and my remarks will be a general discussion of the results and how they compare to other data from similar studies in the area.

Indications are that in case of nearly all elements the concentration decreased as the distance from the smelter increased. The exception to this is the Dunlop site (#7). Why this is so is not clear at this time but factors such as prevailing wind direction, pH, bedrock geology and atmosphere stability will have to be studied.

Manganese levels at Sites 4 and 7 are very high and above the 1500 ppm, in 0-5 cm of topsoil, considered to be excessive by the Ontario Ministry of Environment. Manganese deposits do occur in the area which may explain the levels at these sites.

There does appear to be a general levelling off in the mineral content between 1975 and 1980 with the exception of Sites 1 and 8 which are furtherest from the smelter site. Again the reasons are not obvious. The zinc smelting part of the operation was closed down in 1971 and in 1972 improvements were made in the operation with a view to reducing emissions. It is a possibility that changes were made to the stack which would carry the emissions further from the site. With Site 1 the thermal electric generating plant at Dalhousie is emitting in the fly ash many of the same elements as the smelter such as Pb, Cd, As and S.

The levels of all minerals except manganese, at the two sites mentioned, are well below the levels considered to be excessive by the Ontario Ministry of Environment. It should be noted that this does not necessarily mean toxic levels and there is very little information on specific toxic soil levels for the various minerals. The Pb and Zn levels are well below the 2000 ppm of Pb and 500 ppm of Zn suggested to be toxic or cause damage to plants. The levels of Cu, Pb and Zn are higher than the typical background levels for rural areas reported in the literature.

---

[2] Soil Classification Section, L.R.R.I., Agr. Can. Ottawa. Dr. Alex McKeagne, Head, John Desjardins, Soil Chemistry Technician

There are studies on-going in the area to determine the heavy metal uptake of the vegetation as well as to monitor the fall out levels of various minerals and the mineral content in soils, water, marine life etc. In the case of soils the emphasis so far has been on the top six inches with no sampling below this to determine if there is a leaching effect on the minerals and what effect if any soil type pH and drainage has on the mineral content of the soils and its uptake by plants.

Sampling of the plots will continue but some changes will likely be made to take into consideration the characteristics named above. In addition since receiving the results and discussing them with others involved in similar studies there are distinct possibilities for more cooperative projects re soils vegetation, etc.

REFERENCES: Proposed Electrolytic Zinc Reduction Plant, Belledune, New Brunswick, Environmental Impact Assessment Project Report 6241 - 157 Jan. 1981, Hatch Associates Ltd.

Belledune Regional Bioindicator Study, Jane Spavold, N.B. Dept. of Environment, personal communication.

Dugdale P.J., Hummel B.L.: Cadmium in the Lead Smelter at Belledune: It's Association With Heavy Metals in the Ecosystem: Jan. 1978, Cadmium 77, Edited Proceedings First International Cadmium Conference San Francisco.

Evans P., Levaque Charron R.L. Brunswick Mining and Smelting Corporation, Belledune: personal communication.

pH OF INTERVAL SOIL AND ITS CHANGES BY ADDITIONS OF LIME

PROGRESS REPORT

KARREL MICHALICA[1]

Abstract: Soil reaction, measured on three different sites, ranged widely during the first year after application of liming material. There was no relationship found between the amount of lime material applied and the change of soil reaction in the first year after application.

INTRODUCTION: The study was initiated on the request of vegetable producers of Maugerville - Sheffield area. The purpose was to measure the changes of pH as related to amounts of liming material added as well as to determine time needed to complete a change of pH until equilibmum is reached under the present soil management practices.

METHODS: Three sites, varying in pH, organic matter content, texture and cultural practices were selected for the study. Plots size of 5 m^2 were amended randomly with calcitic, dolomitic lime and gypsum in amounts ranging in equivalent from 2 to 16 tons per hectare. The plots were cultivated to the depth of 15 cm after the addition of amendments. The pH of each plot was determined in the laboratory using 1:2 soil - water suspension.

The study was conducted on Interval soil. It is recent alluvium that is subjected to frequent spring flooding. The surface drainage of the soil is slow, and its internal drainage is impeded due to a high silt content and poorly developed structure.

---

[1] Soil Surveyor, New Brunswick Department of Agriculture and Rural Development

RESULTS: Soil characteristics of sites selected for the study are given in Table 1.

Table 1

Soil Characteristics of Selected Sites

Site	Soil Texture Class	Organic Matter %	Initial Mean pH
1	Silt	1.1	7.0
2	Silt Loam	1.6	6.4
3	Silt Loam	1.8	6.3

The pH measured after additions of amendments as site 3 are given in Table 2. The results illustrate:

1. A large variation in pH was found among individual treatments at all sites.

2. No relationship was found between the amount of liming material added the and change of pH during the first year after application of amendments.

Table 2

pH Measured After Additions of Amendments, Site 3

Type of Amendment	Amount T/ha	pH, June 16/81 Rep 1	pH, June 16/81 Rep 2	pH, July 17/81 Rep 1	pH, July 17/81 Rep 2
Calcitic Lime (Havelock)	4	6.8	6.2	6.5	6.4
	8	7.3	6.3	7.0	6.2
	12	6.5	6.9	6.5	6.9
	16	6.5	6.6	6.6	6.2
Dolomitic Lime (Brookville)	4	6.5	6.3	6.5	6.2
	8	5.6	6.3	5.6	6.3
	12	6.0	6.3	5.9	6.2
	16	6.6	5.9	6.9	5.9
Gypsum	4	6.5	7.2	6.6	6.9
	8	6.1	6.3	6.0	6.4
	16	6.0	6.7	6.1	6.8
No Amendment Added		6.1	6.4	6.4	6.3

It is expected that more time and additional soil mixing is needed to obtain closer relationships between amount of lime amendment and change in soil pH.

RECOMMENDATIONS: It would be beneficial to add another site with lower pH and higher organic matter content (i.e. recently developed land) into the study. The measurements of pH on existing sites should continue for two consecutive years. The detail soil characteristics including particle size analysis and cation exchange capacity should be determined for each plot.

ACKNOWLEDGEMENTS: The co-operation of Maugerville producers Mr. Karl and Bud Harvey, Dr. Ibraham Ghanem, Mr. Renald Cormier and their staff has been greatly appreciated.

REFERENCES: D. Knudsen. How to Get Soil Samples Nebraska Agricultural Extension Circular, 56-116.

PREDICTING SOIL ERODIBILITY (K) VALUES FOR NEW BRUNSWICK SOILS USING A SOIL ERODIBILITY NOMOGRAPH[1]

BY

JOHN K. MACMILLAN, RICHARD RUSSELL AND JEAN LOUIS DAIGLE[2]

Abstract: The erodibility (K) values for New Brunswick soils were predicted using the methods described by Wischmeier, Johnson and Cross in "A Soil Erodibility Nomograph for Farmland and Construction Sites.

INTRODUCTION: The erodibility K value of soils is one of the factors in the Universal Soil Loss Equation. This equation is used by engineers or conservationists in determining the soil loss due to erosion and in designing the conservation structures necessary to reduce this soil loss to acceptable levels. Actual soil loss can only be measured in the field. Such plots are costly in terms of money and manpower and are site specific and the results are extrapolated to similar sites and conditions.

In N.B. little or no work was done on determining erodibility values. In the potato belt where a lot of conservation work has been done erodibility values of soils in Maine were used and extrapolated to similar soils in N.B.

Using the nomograph, erodibility (K) values can be predicted by determining the % organic matter, the particle size distribution and knowing the permeability and structural classes of the soil samples.

METHODS: The methods of collecting samples were changed from 1980. In the past season most of the samples collected were done in conjunction with detailed soil surveys on seven farms or plots. The purpose of this was to determine the effect of slope, crop rotation soil type and management on soil erodibility as shown by the erodibility factors determined.

---

[1] Financially supported by Technology Transfer Program, A.S.A. II.

[2] Soil Surveyor, Soil Technician, Agricultural Laboratory, Agricultural Engineer, respectively, N.B. Department of Agriculture and Rural Development.

RESULTS AND DISCUSSION: Approximately 700 samples were collected. The analysis have not been completed on all samples to date, but with the results available and the results from the 1980 samples, some judgments can be on the erodibility values determined to date and what direction work in this field should take in future. The results obtained compare favorably to actual field loss determinations done in Maine. While there are variations between the samples taken on the same soil types or series, this variation is no greater than the variations that are found in the soil series concept of a soil.

The samples were taken at various depths in addition to surface samples and a definite increase in erodibility values occurred in most soils with depth, with the peak reached at 60-90 cm depending on the type of soil. This becomes important in designing conservation control structures where subsoil must be exposed.

The values determined so far show a distinct trend related to the topography and the position the samples were collected. In general, the erodibility values are lowest at the top of a slope and highest at the bottom level areas adjacent to the bottom of the slope. This provides some indication of the severity of past erosion and coupled with a detailed soil survey could be used to estimate past erosion and deposition and plan future conservation practices.

Using this method of predicting soil erodibility values, Wall, et. al. have developed a system of mapping soil erosion potential. I see no reason why this system cannot be used in New Brunswick since the only factor that would vary is the erodibility values of different soils which can be determined locally. Mapping the soil erosion potential would be very useful in eliminating or reducing many of the problems of soil erosion and soil loss that we are now faced with.

REFERENCES: McKeague 1976, Manual on Soil Sampling and Methods of Analysis, L.R.R.I., Ottawa.

Wischmeier, W.H. 1971, A Soil Erodibility Nomograph for Farmland and Construction Sites Journal of Soil and Water Conservation, September-October, 1971, page 189.

MacMillan, J.K., R. Russell, J.L. Daigle. Predicting Soil Erodibility (K) Values for New Brunswick Soils Using a Soil Erodibility Nomograph. Adaptive Research Reports, 1980.

Wall, G.J., W.T. Dickinson, J.W. Grevel, 1981, Soil Erosion Potential - Brant County, Ontario Proceedings Third Annual Meeting, Expert Committee on Soil Survey, Ottawa.